
circuits Documentation

Release 3.2.2

James Mills

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Contents

1	About	3
2	Documentation	9
3	Indices and tables	153
	Python Module Index	155
	Index	157

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CHAPTER 1

About

circuits is a **Lightweight Event** driven and **Asynchronous Application Framework** for the [Python Programming Language](#) with a strong **Component** Architecture.

circuits also includes a lightweight, high performance and scalable HTTP/WSGI compliant web server as well as various I/O and Networking components.

- [Website](#)
- [Downloads](#)
- [Documentation](#)

Got questions?

- [Ask a Question](#) (Tag it: `circuits-framework`)

1.1 Examples

1.1.1 Hello

```
1  #!/usr/bin/env python
2
3  """circuits Hello World"""
4
5  from circuits import Component, Event
6
7
8  class hello(Event):
9
10     """hello Event"""
```

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```

11
12
13 class App(Component):
14
15     def hello(self):
16         """Hello Event Handler"""
17
18         print("Hello World!")
19
20     def started(self, component):
21         """Started Event Handler
22
23         This is fired internally when your application starts up and can be used to
24         trigger events that only occur once during startup.
25         """
26
27         self.fire(hello()) # Fire hello Event
28
29         raise SystemExit(0) # Terminate the Application
30
31 App().run()

```

Download Source Code: `hello.py`:

1.1.2 Echo Server

```

1  #!/usr/bin/env python
2
3  """Simple TCP Echo Server
4
5  This example shows how you can create a simple TCP Server (an Echo Service)
6  utilizing the builtin Socket Components that the circuits library ships with.
7  """
8
9  from circuits import Debugger, handler
10 from circuits.net.sockets import TCPServer
11
12
13 class EchoServer(TCPServer):
14
15     @handler("read")
16     def on_read(self, sock, data):
17         """Read Event Handler
18
19         This is fired by the underlying Socket Component when there has been
20         new data read from the connected client.
21
22         ..note :: By simply returning, client/server socket components listen
23                   to ValueChagned events (feedback) to determine if a handler
24                   returned some data and fires a subsequent Write event with
25                   the value returned.
26         """
27
28         return data
29

```

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```

30 # Start and "run" the system.
31 # Bind to port 0.0.0.0:8000
32 app = EchoServer(("0.0.0.0", 8000))
33 Debugger().register(app)
34 app.run()

```

Download Source Code: `echoserver.py`:

1.1.3 Hello Web

```

1  #!/usr/bin/env python
2
3  from circuits.web import Controller, Server
4
5
6  class Root(Controller):
7
8      def index(self):
9          """Index Request Handler
10
11          Controller(s) expose implicitly methods as request handlers.
12          Request Handlers can still be customized by using the ``@expose``
13          decorator. For example exposing as a different path.
14          """
15
16          return "Hello World!"
17
18 app = Server(("0.0.0.0", 8000))
19 Root().register(app)
20 app.run()

```

Download Source Code: `helloweb.py`:

More [examples...](#)

1.2 Features

- event driven
- concurrency support
- component architecture
- asynchronous I/O components
- no required external dependencies
- full featured web framework (`circuits.web`)
- coroutine based synchronization primitives

1.3 Requirements

- circuits has no dependencies beyond the [Python Standard Library](#).

1.4 Supported Platforms

- Linux, FreeBSD, Mac OS X, Windows
- Python 2.7, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10
- pypy (the newer the better)

1.5 Installation

The simplest and recommended way to install circuits is with pip. You may install the latest stable release from PyPI with pip:

```
$ pip install circuits
```

If you do not have pip, you may use easy_install:

```
$ easy_install circuits
```

Alternatively, you may download the source package from the [PyPi](#) or the [Downloads](#) extract it and install using:

```
$ python setup.py install
```

Note: You can install the [development version](#) via `pip install circuits==dev`.

1.6 License

circuits is licensed under the [MIT License](#).

1.7 Feedback

We welcome any questions or feedback about bugs and suggestions on how to improve circuits.

Let us know what you think about circuits. [@pythoncircuits](#).

Do you have suggestions for improvement? Then please [Create an Issue](#) with details of what you would like to see. I'll take a look at it and work with you to either incorporate the idea or find a better solution.

1.8 Community

There are also several places you can reach out to the circuits community:

- [Mailing List](#)
- [Google+ Group](#)
- [#circuits IRC Channel](#) on the [Libera.Chat IRC Network](#)
- [Ask a Question on Stackoverflow](#) (Tag it: `circuits-framework`)

1.9 Disclaimer

Whilst I (James Mills) continue to contribute and maintain the circuits project I do not represent the interests or business of my employer Facebook Inc. The contributions I make are of my own free time and have no bearing or relevance to Facebook Inc.

2.1 Getting Started

2.1.1 Quick Start Guide

The easiest way to download and install circuits is to use the [pip](#) command:

```
$ pip install circuits
```

Now that you have successfully downloaded and installed circuits, let's test that circuits is properly installed and working.

First, let's check the installed version:

```
>>> import circuits
>>> print circuits.__version__
```

This should output:

Try some of the examples in the `examples/` directory shipped with the distribution.

Have fun :)

2.1.2 Downloading

Latest Stable Release

The latest stable releases can be downloaded from the [Releases](#) page (*specifically the Tags tab*).

Latest Development Source Code

We use [Git](#) for source control and code sharing.

The latest development branch can be cloned using the following command:

```
$ git clone https://github.com/circuits/circuits.git
```

For further instructions on how to use Git, please refer to the [Git Website](#).

2.1.3 Installing

Installing from a Source Package

If you have downloaded a source archive, this applies to you.

```
$ python setup.py install
```

For other installation options see:

```
$ python setup.py --help install
```

Installing from the Development Repository

If you have cloned the source code repository, this applies to you.

If you have cloned the development repository, it is recommended that you use `setuptools` and use the following command:

```
$ python setup.py develop
```

This will allow you to regularly update your copy of the circuits development repository by simply performing the following in the circuits working directory:

```
$ hg pull -u
```

Note: You do not need to reinstall if you have installed with `setuptools` via the circuits repository and used `setuptools` to install in “develop” mode.

2.1.4 Requirements and Dependencies

- circuits has no **required** dependencies beyond the [Python Standard Library](#).
- Python: `>= 2.7` or `python >= 2.0`

Supported Platforms Linux, FreeBSD, Mac OS X, Windows

Supported Python Versions 2.7, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10

Supported pypy Versions 2.0

Other Optional Dependencies

These dependencies are not strictly required and only add additional features.

- [pydot](#) – For rendering component graphs of an application.

- `pyinotify` – For asynchronous file system event notifications and the `circuits.io.notify` module.

2.2 circuits Tutorials

2.2.1 Tutorial

Overview

Welcome to the circuits tutorial. This 5-minute tutorial will guide you through the basic concepts of circuits. The goal is to introduce new concepts incrementally with walk-through examples that you can try out! By the time you’ve finished, you should have a good basic understanding of circuits, how it feels and where to go from there.

The Component

First up, let’s show how you can use the `Component` and run it in a very simple application.

```
1  #!/usr/bin/env python
2
3  from circuits import Component
4
5  Component().run()
```

Download 001.py

Okay so that’s pretty boring as it doesn’t do very much! But that’s okay... Read on!

Let’s try to create our own custom `Component` called `MyComponent`. This is done using normal Python subclassing.

```
1  #!/usr/bin/env python
2
3  from circuits import Component
4
5
6  class MyComponent(Component):
7
8      """My Component"""
9
10 MyComponent().run()
```

Download 002.py

Okay, so this still isn’t very useful! But at least we can create custom components with the behavior we want.

Let’s move on to something more interesting...

Note: `Component(s)` in circuits are what sets circuits apart from other Asynchronous or Concurrent Application Frameworks. Components(s) are used as building blocks from simple behaviors to complex ones (*composition of simpler components to form more complex ones*).

Event Handlers

Let’s now extend our little example to say “Hello World!” when it’s started.

```
1  #!/usr/bin/env python
2
3  from circuits import Component
4
5
6  class MyComponent (Component) :
7
8      def started(self, *args):
9          print("Hello World!")
10
11 MyComponent().run()
```

Download 003.py

Here we've created a simple **Event Handler** that listens for the `started` Event.

Note: Methods defined in a custom subclassed `Component` are automatically turned into **Event Handlers**. The only exception to this are methods prefixed with an underscore (`_`).

Note: If you do not want this *automatic* behavior, inherit from `BaseComponent` instead which means you will **have to** use the `~circuits.core.handlers.handler` decorator to define your **Event Handlers**.

Running this we get:

```
Hello World!
```

Alright! We have something slightly more useful! Whoohoo it says hello!

Note: Press `^C` (`CTRL + C`) to exit.

Registering Components

So now that we've learned how to use a `Component`, create a custom `Component` and create simple `Event Handlers`, let's try something a bit more complex by creating a complex component made up of two simpler ones.

Note: We call this **Component Composition** which is the very essence of the circuits Application Framework.

Let's create two components:

- Bob
- Fred

```
1  #!/usr/bin/env python
2
3  from circuits import Component
4
5
6  class Bob (Component) :
7
```

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```

8     def started(self, *args):
9         print("Hello I'm Bob!")
10
11
12 class Fred(Component):
13
14     def started(self, *args):
15         print("Hello I'm Fred!")
16
17 (Bob() + Fred()).run()

```

Download 004.py

Notice the way we register the two components `Bob` and `Fred` together ? Don't worry if this doesn't make sense right now. Think of it as putting two components together and plugging them into a circuit board.

Running this example produces the following result:

```

Hello I'm Bob!
Hello I'm Fred!

```

Cool! We have two components that each do something and print a simple message on the screen!

Complex Components

Now, what if we wanted to create a Complex Component? Let's say we wanted to create a new Component made up of two other smaller components?

We can do this by simply registering components to a Complex Component during initialization.

Note: This is also called **Component Composition** and avoids the classical [Diamond problem](#) of Multiple Inheritance. In circuits we do not use Multiple Inheritance to create **Complex Components** made up of two or more base classes of components, we instead compose them together via registration.

```

1  #!/usr/bin/env python
2
3  from circuits import Component
4  from circuits.tools import graph
5
6
7  class Pound(Component):
8
9      def __init__(self):
10         super(Pound, self).__init__()
11
12         self.bob = Bob().register(self)
13         self.fred = Fred().register(self)
14
15     def started(self, *args):
16         print(graph(self.root))
17
18
19 class Bob(Component):
20

```

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```

21     def started(self, *args):
22         print("Hello I'm Bob!")
23
24
25 class Fred(Component):
26
27     def started(self, *args):
28         print("Hello I'm Fred!")
29
30 Pound().run()

```

Download 005.py

So now Pound is a Component that consists of two other components registered to it: Bob and Fred

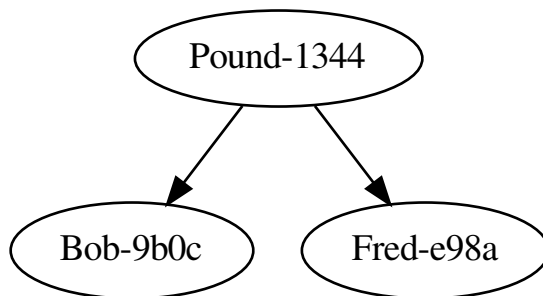
The output of this is identical to the previous:

```

* <Pound/* 3391:MainThread (queued=0, channels=1, handlers=3) [R]>
* <Bob/* 3391:MainThread (queued=0, channels=1, handlers=1) [S]>
* <Fred/* 3391:MainThread (queued=0, channels=1, handlers=1) [S]>
Hello I'm Bob!
Hello I'm Fred!

```

The only difference is that Bob and Fred are now part of a more Complex Component called Pound. This can be illustrated by the following diagram:



Note: The extra lines in the above output are an ASCII representation of the above graph (*produced by pydot + graphviz*).

Cool :-)

Component Inheritance

Since circuits is a framework written for the [Python Programming Language](#) it naturally inherits properties of Object Orientated Programming (OOP) – such as inheritance.

So let's take our Bob and Fred components and create a Base Component called Dog and modify our two dogs (Bob and Fred) to subclass this.

```

1  #!/usr/bin/env python
2
3  from circuits import Component, Event
4
5
6  class woof(Event):
7
8      """woof Event"""
9
10
11 class Pound(Component):
12
13     def __init__(self):
14         super(Pound, self).__init__()
15
16         self.bob = Bob().register(self)
17         self.fred = Fred().register(self)
18
19     def started(self, *args):
20         self.fire(woof())
21
22
23 class Dog(Component):
24
25     def woof(self):
26         print("Woof! I'm %s!" % self.name)
27
28
29 class Bob(Dog):
30
31     """Bob"""
32
33
34 class Fred(Dog):
35
36     """Fred"""
37
38 Pound().run()

```

Download 006.py

Now let's try to run this and see what happens:

```

Woof! I'm Bob!
Woof! I'm Fred!

```

So both dogs barked! Hmmm

Component Channels

What if we only want one of our dogs to bark? How do we do this without causing the other one to bark as well?

Easy! Use a separate channel like so:

```

1  #!/usr/bin/env python
2
3  from circuits import Component, Event

```

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```
4
5
6 class woof(Event):
7
8     """woof Event"""
9
10
11 class Pound(Component):
12
13     def __init__(self):
14         super(Pound, self).__init__()
15
16         self.bob = Bob().register(self)
17         self.fred = Fred().register(self)
18
19     def started(self, *args):
20         self.fire(woof(), self.bob)
21
22
23 class Dog(Component):
24
25     def woof(self):
26         print("Woof! I'm %s!" % self.name)
27
28
29 class Bob(Dog):
30
31     """Bob"""
32
33     channel = "bob"
34
35
36 class Fred(Dog):
37
38     """Fred"""
39
40     channel = "fred"
41
42 Pound().run()
```

[Download 007.py](#)

Note: Events can be fired with either the `.fire(...)` or `.fireEvent(...)` method.

If you run this, you'll get:

```
Woof! I'm Bob!
```

Event Objects

So far in our tutorial we have been defining an Event Handler for a builtin Event called `started`. What if we wanted to define our own Event Handlers and our own Events? You've already seen how easy it is to create a new Event Handler by simply defining a normal Python method on a Component.

Defining your own Events helps with documentation and testing and makes things a little easier.

Example:

```
class MyEvent(Event):
    """MyEvent"""
```

So here's our example where we'll define a new Event called Bark and make our Dog fire a Bark event when our application starts up.

```
1  #!/usr/bin/env python
2
3  from circuits import Component, Event
4
5
6  class bark(Event):
7
8      """bark Event"""
9
10
11  class Pound(Component):
12
13      def __init__(self):
14          super(Pound, self).__init__()
15
16          self.bob = Bob().register(self)
17          self.fred = Fred().register(self)
18
19
20  class Dog(Component):
21
22      def started(self, *args):
23          self.fire(bark())
24
25      def bark(self):
26          print("Woof! I'm %s!" % self.name)
27
28
29  class Bob(Dog):
30
31      """Bob"""
32
33      channel = "bob"
34
35
36  class Fred(Dog):
37
38      """Fred"""
39
40      channel = "fred"
41
42  Pound().run()
```

Download 008.py

If you run this, you'll get:

```
Woof! I'm Bob!
Woof! I'm Fred!
```

The Debugger

Lastly...

Asynchronous programming has many advantages but can be a little harder to write and follow. A silently caught exception in an Event Handler, or an Event that never gets fired, or any number of other weird things can cause your application to fail and leave you scratching your head.

Fortunately circuits comes with a `Debugger` Component to help you keep track of what's going on in your application, and allows you to tell what your application is doing.

Let's say that we defined out `bark` Event Handler in our `Dog` Component as follows:

```
def bark(self):
    print("Woof! I'm %s!" % name)
```

Now clearly there is no such variable as `name` in the local scope.

For reference here's the entire example...

```
1  #!/usr/bin/env python
2
3  from circuits import Component, Event
4
5
6  class bark(Event):
7
8      """bark Event"""
9
10
11  class Pound(Component):
12
13      def __init__(self):
14          super(Pound, self).__init__()
15
16          self.bob = Bob().register(self)
17          self.fred = Fred().register(self)
18
19
20  class Dog(Component):
21
22      def started(self, *args):
23          self.fire(bark())
24
25      def bark(self):
26          print("Woof! I'm %s!" % name)  # noqa
27
28
29  class Bob(Dog):
30
31      """Bob"""
32
33      channel = "bob"
34
35
36  class Fred(Dog):
37
38      """Fred"""
39
```

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```

40     channel = "fred"
41
42 Pound().run()

```

Download 009.py

If you run this, you'll get:

That's right! You get nothing! Why? Well in circuits any error or exception that occurs in a running application is automatically caught and dealt with in a way that lets your application "keep on going". Crashing is unwanted behavior in a system so we expect to be able to recover from horrible situations.

SO what do we do? Well that's easy. circuits comes with a `Debugger` that lets you log all events as well as all errors so you can quickly and easily discover which Event is causing a problem and which Event Handler to look at.

If you change Line 34 of our example...

From:

To:

```

from circuits import Debugger

(Pound() + Debugger()).run()

```

Then run this, you'll get the following:

```

<Registered[bob:registered] [<Bob/bob 3191:MainThread (queued=0, channels=2,
↳ handlers=2) [S]>, <Pound/* 3191:MainThread (queued=0, channels=5, handlers=5) [R]>]
↳ {}>
<Registered[fred:registered] [<Fred/fred 3191:MainThread (queued=0, channels=2,
↳ handlers=2) [S]>, <Pound/* 3191:MainThread (queued=0, channels=5, handlers=5) [R]>]
↳ {}>
<Registered[*:registered] [<Debugger/* 3191:MainThread (queued=0, channels=1,
↳ handlers=1) [S]>, <Pound/* 3191:MainThread (queued=0, channels=5, handlers=5) [R]>]
↳ {}>
<Started[*:started] [<Pound/* 3191:MainThread (queued=0, channels=5, handlers=5) [R]>,
↳ None] {}>
<Bark[bob:bark] [] {}>
<Bark[fred:bark] [] {}>
<Error[*:exception] [<type 'exceptions.NameError'>, NameError("global name 'name' is
↳ not defined",), [' File "/home/prologic/work/circuits/circuits/core/manager.py",
↳ line 459, in __handleEvent\n    retval = handler(*eargs, **ekwargs)\n', ' File
↳ "source/tutorial/009.py", line 22, in bark\n    print("Woof! I\'m %s!" % name)\n'],
↳ <bound method ?.bark of <Bob/bob 3191:MainThread (queued=0, channels=2, handlers=2)
↳ [S]>>] {}>
ERROR <listener on ('bark',) {target='bob', priority=0.0}> (<type 'exceptions.
↳ NameError'>): global name 'name' is not defined
    File "/home/prologic/work/circuits/circuits/core/manager.py", line 459, in __
↳ handleEvent
    retval = handler(*eargs, **ekwargs)
    File "source/tutorial/009.py", line 22, in bark
    print("Woof! I'm %s!" % name)

<Error[*:exception] [<type 'exceptions.NameError'>, NameError("global name 'name' is
↳ not defined",), [' File "/home/prologic/work/circuits/circuits/core/manager.py",
↳ line 459, in __handleEvent\n    retval = handler(*eargs, **ekwargs)\n', ' File
↳ "source/tutorial/009.py", line 22, in bark\n    print("Woof! I\'m %s!" % name)\n'],
↳ <bound method ?.bark of <Fred/fred 3191:MainThread (queued=0, channels=2,
↳ handlers=2) [S]>>] {}>

```

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```
ERROR <listener on ('bark',) {target='fred', priority=0.0}> (<type 'exceptions.
↳NameError'>): global name 'name' is not defined
  File "/home/prologic/work/circuits/circuits/core/manager.py", line 459, in __
↳handleEvent
    retval = handler(*eargs, **ekwargs)
  File "source/tutorial/009.py", line 22, in bark
    print("Woof! I'm %s!" % name)

^C<Signal[*:signal] [2, <frame object at 0x808e8ec>] {}>
<Stopped[*:stopped] [<Pound/* 3191:MainThread (queued=0, channels=5, handlers=5) [S]>
↳] {}>
<Stopped[*:stopped] [<Pound/* 3191:MainThread (queued=0, channels=5, handlers=5) [S]>
↳] {}>
```

You'll notice whereas there was no output before there is now a pretty detailed output with the Debugger added to the application. Looking through the output, we find that the application does indeed start correctly, but when we fire our Bark Event it coughs up two exceptions, one for each of our dogs (Bob and Fred).

From the error we can tell where the error is and roughly where to look in the code.

Note: You'll notice many other events that are displayed in the above output. These are all default events that circuits has builtin which your application can respond to. Each builtin Event has a special meaning with relation to the state of the application at that point.

See: [circuits.core.events](#) for detailed documentation regarding these events.

The correct code for the bark Event Handler should be:

```
def bark(self):
    print("Woof! I'm %s!" % self.name)
```

Running again with our correction results in the expected output:

```
Woof! I'm Bob!
Woof! I'm Fred!
```

That's it folks!

Hopefully this gives you a feel of what circuits is all about and an easy tutorial on some of the basic concepts. As you're no doubt itching to get started on your next circuits project, here's some recommended reading:

- [../faq](#)
- [../api/index](#)

2.2.2 Telnet Tutorial

Overview

Welcome to our 2nd circuits tutorial. This tutorial is going to walk you through the [telnet Example](#) showing you how to various parts of the circuits component library for building a simple TCP client that also accepts user input.

Be sure you have circuits installed before you start:

```
pip install circuits
```


See: *Installing*

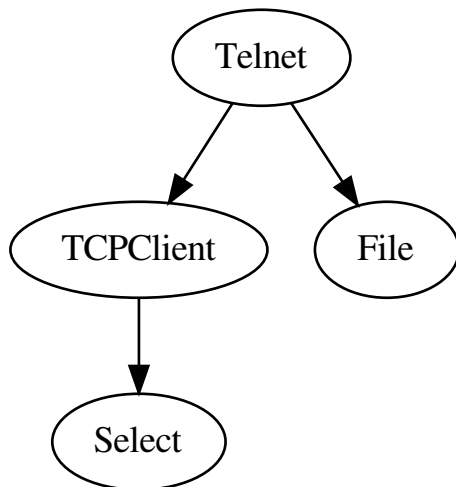
Components

You will need the following components:

1. The *TCPClient* Component
2. The *File* Component
3. The *Component* Component

All these are available in the circuits library so there is nothing for you to do. Click on each to read more about them.

Design



The above graph is the overall design of our Telnet application. What's shown here is a relationship of how the components fit together and the overall flow of events.

For example:

1. Connect to remote TCP Server.
2. Read input from User.
3. Write input from User to connected Socket.
4. Wait for data from connected Socket and display.

Note: The *Select* Component shown is required by our application for Asynchronous I/O polling however we do not need to explicitly use it as it is automatically imported and registered simply by utilizing the *TCPClient* Component.

Implementation

Without further delay here's the code:

```
1 #!/usr/bin/env python
2
3  import sys
4
5  from circuits import Component, handler
6  from circuits.io import File
7  from circuits.net.events import connect, write
8  from circuits.net.sockets import TCPClient
9
10
11 class Telnet(Component):
12
13     channel = "telnet"
14
15     def init(self, host, port):
16         self.host = host
17         self.port = port
18
19         TCPClient(channel=self.channel).register(self)
20         File(sys.stdin, channel="stdin").register(self)
21
22     def ready(self, socket):
23         self.fire(connect(self.host, self.port))
24
25     def read(self, data):
26         print(data.strip())
27
28     @handler("read", channel="stdin")
29     def read_user_input(self, data):
30         self.fire(write(data))
31
32
33 host = sys.argv[1]
34 port = int(sys.argv[2])
35
36 Telnet(host, port).run()
```

Download `telnet.py`

Discussion

Some important things to note...

1. Notice that we defined a channel for our Telnet Component?

This is so that the events of `TCPClient` and `File` don't collide. Both of these components share a very similar interface in terms of the events they listen to.

```
class Telnet(Component):

    channel = "telnet"
```

2. Notice as well that in defining a channel for our Telnet Component we've also "registered" the `TCPClient` Component so that it has the same channel as our Telnet Component.

Why? We want our Telnet Component to receive all of the events of the *TCPClient* Component.

```
TCPClient(channel=self.channel).register(self)
```

3. In addition to our *TCPClient* Component being registered with the same channel as our Telnet Component we can also see that we have registered a *File* Component however we have chosen a different channel here called `stdin`.

Why? We don't want the events from *TCPClient* and subsequently our Telnet Component to collide with the events from *File*.

So we setup a Component for reading user input by using the *File* Component and attaching an event handler to our Telnet Component but listening to events from our `stdin` channel.

```
File(sys.stdin, channel="stdin").register(self)
```

```
@handler("read", channel="stdin")
def read_user_input(self, data):
    self.fire(write(data))
```

Here is what the event flow would look like if you were to register the *Debugger* to the Telnet Component.

```
from circuits import Debugger
(Telnet(host, port) + Debugger()).run()
```

```
$ python telnet.py 10.0.0.2 9000
<registered[telnet] (<TCPClient/telnet 21995:MainThread (queued=0) [S]>, <Telnet/
↳telnet 21995:MainThread (queued=4) [R]> )>
<registered[stdin] (<File/stdin 21995:MainThread (queued=0) [S]>, <Telnet/telnet_
↳21995:MainThread (queued=5) [R]> )>
<registered[*] (<Debugger/* 21995:MainThread (queued=0) [S]>, <Telnet/telnet_
↳21995:MainThread (queued=5) [R]> )>
<started[telnet] (<Telnet/telnet 21995:MainThread (queued=4) [R]> )>
<registered[select] (<Select/select 21995:MainThread (queued=0) [S]>, <TCPClient/
↳telnet 21995:MainThread (queued=0) [S]> )>
<ready[telnet] (<TCPClient/telnet 21995:MainThread (queued=0) [S]> )>
<ready[stdin] (<File/stdin 21995:MainThread (queued=0) [S]> )>
<connect[telnet] ('10.0.0.2', 9000 )>
<_open[stdin] ( )>
<connected[telnet] ('10.0.0.2', 9000 )>
<opened[stdin] ('<stdin>', 'r' )>
Hello World!
<_read[stdin] (<open file '<stdin>', mode 'r' at 0x7f32ff5ab0c0> )>
<read[stdin] ('Hello World!\n' )>
<write[telnet] ('Hello World!\n' )>
<_write[telnet] (<socket._socketobject object at 0x11f7f30> )>
<_read[telnet] (<socket._socketobject object at 0x11f7f30> )>
<read[telnet] ('Hello World!\n' )>
Hello World!
^C<signal[telnet] (2, <frame object at 0x12b0a10> )>
<stopped[telnet] (<Telnet/telnet 21995:MainThread (queued=0) [S]> )>
<close[telnet] ( )>
<close[stdin] ( )>
<disconnected[telnet] ( )>
<closed[stdin] ( )>
```

Testing

To try this example out, download a copy of the [echoserver Example](#) and copy and paste the full source code of the Telnet example above into a file called `telnet.py`.

In one terminal run:

```
$ python echoserver.py
```

In a second terminal run:

```
$ python telnet.py localhost 9000
```

Have fun!

For more examples see [examples](#).

See also:

- [Frequently Asked Questions](#)
- [API Documentation](#)

2.3 circuits User Manual

2.3.1 Core Library

Components

The architectural concept of circuits is to encapsulate system functionality into discrete manageable and reusable units, called *Components*, that interact by sending and handling events that flow throughout the system.

Technically, a circuits *Component* is a Python class that inherits (*directly or indirectly*) from *BaseComponent*.

Components can be sub-classed like any other normal Python class, however components can also be composed of other components and it is natural to do so. These are called *Complex Components*. An example of a Complex Component within the circuits library is the `circuits.web.servers.Server` Component which is comprised of:

- `circuits.net.sockets.TCPServer`
- `circuits.web.servers.BaseServer`
- `circuits.web.http.HTTP`
- `circuits.web.dispatchers.dispatcher.Dispatcher`

Note: There is no class or other technical means to mark a component as a complex component. Rather, all component instances in a circuits based application belong to some component tree (there may be several), with Complex Components being a subtree within that structure.

A Component is attached to the tree by registering with the parent and detached by unregistering itself. See methods:

- `register()`
- `unregister()`

The hierarchy of components facilitates addition and removal of complex components at runtime.

All registered components in the hierarchy receive all applicable events regardless of lineage.

Component Registration

To register a component use the `register()` method.

```

1 from circuits import Component
2
3
4 class Foo(Component):
5     """Foo Component"""
6
7
8 class App(Component):
9     """App Component"""
10
11     def init(self):
12         Foo().register(self)
13
14
15 app = App()
16 debugger = Debugger().register(app)
17 app.run()
```

Unregistering Components

Components are unregistered via the `unregister()` method.

```
debugger.unregister()
```

Note: You need a reference to the component you wish to unregister. The `register()` method returns you a reference of the component that was registered.

Convenient Shorthand Form

After a while when your application becomes rather large and complex with many components and component registrations you will find it cumbersome to type `.register(blah)`.

circuits has several convenient methods for component registration and deregistration that work in an identical fashion to their `register()` and `unregister()` counterparts.

These convenience methods follow normal mathematical operator precedence rules and are implemented by overloading the Python `__add__`, `__iadd__`, `__sub__` and `__isub__`.

The mapping is as follow:

- `register()` map to `+` and `+=`
- `unregister()` map to `>` and `-=`

For example the above could have been written as:

```
1 from circuits import Component
2
3
4 class Foo(Component):
5     """Foo Component"""
6
7
8 class App(Component):
9     """App Component"""
10
11     def init(self):
12         self += Foo()
13
14
15 (App() + Debugger()).run()
```

Implicit Component Registration(s)

Sometimes it's handy to implicitly register components into another component by simply referencing the other component instance as a class attribute of the other.

Example:

```
>>> from circuits import Component
>>>
>>> class Foo(Component):
...     """Foo Component"""
...
>>> class App(Component):
...     """App Component"""
...
...     foo = Foo()
...
>>> app = App()
>>> app.components
set([<Foo/* 28599:MainThread (queued=0) [S]>])
>>>
```

The [telnet Example](#) does this for example.

Debugger

The [core Debugger](#) component is the standard way to debug your circuits applications. It services two purposes:

- Logging events as they flow through the system.
- Logging any exceptions that might occurs in your application.

Usage

Using the [Debugger](#) in your application is very straight forward just like any other component in the circuits component library. Simply add it to your application and register it somewhere (*it doesn't matter where*).

Example:

```

1 from circuits import Component, Debugger
2
3
4 class App(Component):
5     """Your Application"""
6
7
8 app = App()
9 Debugger().register(app)
10 app.run()

```

Sample Output(s)

Here are some example outputs that you should expect to see when using the *Debugger* component in your application.

Example Code:

```

1 from circuits import Event, Component, Debugger
2
3
4 class foo(Event):
5     """foo Event"""
6
7
8 class App(Component):
9
10     def foo(self, x, y):
11         return x + y
12
13
14 app = App() + Debugger()
15 app.start()

```

Run with:

```
python -i app.py
```

Logged Events:

```

<registered[*] (<Debugger/* 27098:App (queued=0) [S]>, <App/* 27098:App (queued=2)
↳ [R]> )>
<started[*] (<App/* 27098:App (queued=1) [R]> )>
>>> app.fire(foo(1, 2))
<Value () result=False; errors=False; for <foo[*] (1, 2 )>
>>> <foo[*] (1, 2 )>

```

Logged Exceptions:

```

>>> app.fire(foo())
<Value () result=False; errors=False; for <foo[*] ( )>
>>> <foo[*] ( )>
<exception[*] (<type 'exceptions.TypeError', TypeError('foo() takes exactly 3
↳ arguments (1 given)'), [' File "/home/prologic/work/circuits/circuits/core/
↳ manager.py", line 561, in _dispatcher\n    value = handler(*eargs, **ekwargs)\n']
↳ handler=<bound method App.foo of <App/* 27098:App (queued=1) [R]>>, fevent=<foo[*]
↳ ( )>>>

```

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```
ERROR <handler[*][foo] (App.foo)> (<foo[*] ( )>) {<type 'exceptions.TypeError'>}:  
↳foo() takes exactly 3 arguments (1 given)  
  File "/home/prologic/work/circuits/circuits/core/manager.py", line 561, in _  
↳dispatcher  
    value = handler(*eargs, **ekwargs)
```

Events

Basic usage

Events are objects that contain data (*arguments and keyword arguments*) about the message being sent to a receiving component. Events are triggered by using the `fire()` method of any registered component.

Some events in circuits are fired implicitly by the circuits core like the `started` event used in the tutorial or explicitly by components while handling some other event. Once fired, events are dispatched to the components that are interested in these events (*components whose event handlers match events of interest*).

Events are usually fired on one or more channels, allowing components to gather in “interest groups”. This is especially useful if you want to reuse basic components such as a `TCPServer`. A `TCPServer` component fires a `read` event for every package of data that it receives. If we did not have support for channels, it would be very difficult to build two servers in a single process without their read events colliding.

Using channels, we can put one server and all components interested in its events on one channel, and another server and the components interested in this other server’s events on another channel.

Components are associated with a channel by setting their `channel` class or instance attribute.

See also:

[*Component*](#)

Besides having a name, events carry additional arbitrary information. This information is passed as arguments or keyword arguments to the constructor. It is then delivered to the event handler method that must have exactly the same number of arguments and keyword arguments. Of course, as is usual in Python, you can also pass additional information by setting attributes of the event object, though this usage pattern is discouraged.

Filtering

Events can be filtered by stopping other event handlers from continuing to process the event.

To do this, simply call the `stop()` method.

Example:

```
@handler("foo")  
def stop_foo(self, event, *args, **kwargs):  
    event.stop()
```

Here any other event handlers also listening to “foo” will not be processed.

Note: It’s important to use priority event handlers here in this case as all event handlers and events run with the same priority unless explicitly told otherwise.

Changed in version 3.0: In circuits 2.x you declared your event handler to be a filter by using `@handler(filter=True)` and returned a True-ish value from the respective event handler to achieve the same effect. This is **no longer** the case in circuits 3.x Please use `event.stop()` as noted above.

Events as result collectors

Apart from delivering information to handlers, event objects may also collect information. If a handler returns something that is not `None`, it is stored in the event's `value` attribute. If a second (or any subsequent) handler invocation also returns a value, the values are stored as a list. Note that the value attribute is of type `Value` and you must access its property `value` to access the data stored (`collected_information = event.value.value`).

The collected information can be accessed by handlers in order to find out about any return values from the previously invoked handlers. More useful though, is the possibility to access the information after all handlers have been invoked. After all handlers have run successfully (i.e. no handler has thrown an error) circuits may generate an event that indicates the successful handling. This event has the name of the event just handled with “Success” appended. So if the event is called `Identify` then the success event is called `IdentifySuccess`. Success events aren't delivered by default. If you want successful handling to be indicated for an event, you have to set the optional attribute `success` of this event to `True`.

The handler for a success event must be defined with two arguments. When invoked, the first argument is the event just having been handled successfully and the second argument is (as a convenience) what has been collected in `event.value.value` (note that the first argument may not be called `event`, for an explanation of this restriction as well as for an explanation why the method is called `identify_success` see the section on handlers).

```

1  #!/usr/bin/env python
2
3  from circuits import Component, Debugger, Event
4
5
6  class Identify(Event):
7
8      """Identify Event"""
9
10     success = True
11
12
13  class Pound(Component):
14
15     def __init__(self):
16         super(Pound, self).__init__()
17
18         Debugger().register(self)
19         Bob().register(self)
20         Fred().register(self)
21
22     def started(self, *args):
23         self.fire(Identify())
24
25     def Identify_success(self, evt, result):
26         if not isinstance(result, list):
27             result = [result]
28         print "In pound:"
29         for name in result:
30             print name
31
32

```

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```
33 class Dog(Component):
34
35     def Identify(self):
36         return self.__class__.__name__
37
38
39 class Bob(Dog):
40
41     """Bob"""
42
43
44 class Fred(Dog):
45
46     """Fred"""
47
48 Pound().run()
```

Download `handler_returns.py`

Advanced usage

Sometimes it may be necessary to take some action when all state changes triggered by an event are in effect. In this case it is not sufficient to wait for the completion of all handlers for this particular event. Rather, we also have to wait until all events that have been fired by those handlers have been processed (and again wait for the events fired by those events' handlers, and so on). To support this scenario, circuits can fire a `Complete` event. The usage is similar to the previously described success event. Details can be found in the API description of `circuits.core.events.Event`.

Handlers

Explicit Event Handlers

Event Handlers are methods of components that are invoked when a matching event is dispatched. These can be declared explicitly on a `BaseComponent` or `Component` or by using the `handler()` decorator.

```
1  #!/usr/bin/env python
2
3  from circuits import BaseComponent, Debugger, handler
4
5
6  class MyComponent(BaseComponent):
7
8      def __init__(self):
9          super(MyComponent, self).__init__()
10
11          Debugger().register(self)
12
13      @handler("started", channel="*")
14      def system_started(self, component):
15          print "Start event detected"
16
17  MyComponent().run()
```

Download `handler_annotation.py`

The handler decorator on line 14 turned the method `system_started` into an event handler for the event `started`. When defining explicit event handlers in this way, it's convention to use the following pattern:

```
@handler("foo")
def print_foobar(self, ...):
    print("FooBar!")
```

This makes reading code clear and concise and obvious to the reader that the method is not part of the class's public API (*leading underscore as per Python convention*) and that it is invoked for events of type `SomeEvent`.

The optional keyword argument “channel” can be used to attach the handler to a different channel than the component's channel (*as specified by the component's channel attribute*).

Handler methods must be declared with arguments and keyword arguments that match the arguments passed to the event upon its creation. Looking at the API for `started` you'll find that the component that has been started is passed as an argument to its constructor. Therefore, our handler method must declare one argument (*Line 14*).

The `handler()` decorator accepts other keyword arguments that influence the behavior of the event handler and its invocation. Details can be found in the API description of `handler()`.

Implicit Event Handlers

To make things easier for the developer when creating many event handlers and thus save on some typing, the `Component` can be used and subclassed instead which provides an implicit mechanism for creating event handlers.

Basically every method in the component is automatically and implicitly marked as an event handler with `@handler(<name>)` where `<name>` is the name of each method applied.

The only exceptions are:

- Methods that start with an underscore `_`.
- Methods already marked explicitly with the `handler()` decorator.

Example:

```
#!/usr/bin/env python

from circuits import handler, Component, Event

class hello(Event):
    """hello Event"""

class App(Component):

    def _say(self, message):
        """Print the given message

        This is a private method as denoted via the prefixed underscore.
        This will not be turned into an event handler.
        """

        print(message)

    def started(self, manager):
```

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```
self._say("App Started!")
self.fire(hello())
raise SystemExit(0)

@handler("hello")
def print_hello(self):
    """hello Event Handlers

    Print "Hello World!" when the ``hello`` Event is received.

    As this is already decorated with the ``@handler``
    decorator, it will be left as it is and won't get
    touched by the implicit event handler creation
    mechanisms.
    """

    print("Hello World!")

@handler(False)
def test(self, *args, **kwargs):
    """A simple test method that does nothing

    This will not be turned into an event handlers
    because of the ``False`` argument passed to the
    ``@handler`` decorator. This only makes sense
    when subclassing ``Component`` and you want to
    have fine grained control over what methods
    are not turned into event handlers.
    """

    pass
```

```
App().run()
```

Note: You can specify that a method will not be marked as an event handler by passing `False` as the first argument to `@handler()`.

Manager

The *core Manager* class is the base class of all components in circuits. It is what defines the API(s) of all components and necessary machinery to run your application smoothly.

Note: It is not recommended to actually use the *Manager* in your application code unless you know what you're doing.

Warning: A *Manager* **does not** know how to register itself to other components! It is a manager, not a component, however it does form the basis of every component.

Usage

Using the *Manager* in your application is not really recommended except in some special circumstances where you want to have a top-level object that you can register things to.

Example:

```

1 from circuits import Component, Manager
2
3
4 class App(Component):
5     """Your Application"""
6
7
8 manager = Manager()
9 App().register(manager)
10 manager.run()
```

Note: If you *think* you need a *Manager* chances are you probably don't. Use a *Component* instead.

Values

The *core Value* class is an internal part of circuits' *Futures* and *Promises* used to fulfill promises of the return value of an event handler and any associated chains of events and event handlers.

Basically when you fire an event `foo()` such as:

```
x = self.fire(foo())
```

`x` here is an instance of the *Value* class which will contain the value returned by the event handler for `foo` in the `.value` property.

Note: There is also `getValue()` which can be used to also retrieve the underlying value held in the instance of the *Value* class but you should not need to use this as the `.value` property takes care of this for you.

The only other API you may need in your application is the `notify` which can be used to trigger a `value_changed` event when the underlying *Value* of the event handler has changed. In this way you can do something asynchronously with the event handler's return value no matter when it finishes.

Example Code:

```

1 #!/usr/bin/python -i
2
3
4 from circuits import handler, Event, Component, Debugger
5
6
7 class hello(Event):
8     "hello Event"
9
10
11 class test(Event):
12     "test Event"
```

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```

13
14
15 class App(Component):
16
17     def hello(self):
18         return "Hello World!"
19
20     def test(self):
21         return self.fire(hello())
22
23     @handler("hello_value_changed")
24     def _on_hello_value_changed(self, value):
25         print("hello's return value was: {}".format(value))
26
27
28 app = App()
29 Debugger().register(app)

```

Example Session:

```

1 $ python -i ../app.py
2 >>> x = app.fire(test())
3 >>> x.notify = True
4 >>> app.tick()
5 <registered[*] (<Debugger/* 27798:MainThread (queued=0) [S]>, <App/* 27798:MainThread_
  ↳ (queued=1) [S]> )>
6 <test[*] ( )>
7 >>> app.tick()
8 <hello[*] ( )>
9 >>> app.tick()
10 <test_value_changed[<App/* 27798:MainThread (queued=0) [S]>] (<Value ('Hello World!')_
  ↳ result=True; errors=False; for <test[*] ( )> )>
11 >>> app.tick()
12 >>> x
13 <Value ('Hello World!') result=True; errors=False; for <test[*] ( )>
14 >>> x.value
15 'Hello World!'
16 >>>

```

The `Value.notify` attribute can also be set to the name of an event which should be used to fire the `value_changed` event to.

If the form `x.notify = True` used then the event that gets fired is a concatenation of the original event and the `value_changed` event. e.g: `foo_value_changed`.

Note: This is a bit advanced and should only be used by experienced users of the circuits framework. If you simply want basic synchronization of event handlers it's recommended that you try the `circuits.Component.call()` and `circuits.Component.wait()` synchronization primitives first.

2.3.2 Miscellaneous

Tools

There are two main tools of interest in circuits. These are:

- `circuits.tools.inspect()`
- `circuits.tools.graph()`

These can be found in the `circuits.tools` module.

Introspecting your Application

The `inspect()` function is used to help introspect your application by displaying all the channels and events handlers defined through the system including any additional meta data about them.

Example:

```
>>> from circuits import Component
>>> class App(Component):
...     def foo(self):
...         pass
...
>>> app = App()
>>> from circuits.tools import inspect
>>> print(inspect(app))
Components: 0

Event Handlers: 3
unregister; 1
  <handler[*][unregister] (App._on_unregister)>
foo; 1
  <handler[*][foo] (App.foo)>
prepare_unregister_complete; 1
  <handler[<instance of App>][prepare_unregister_complete] (App._on_prepare_
  ↳unregister_complete)>
```

Displaying a Visual Representation of your Application

The `graph()` function is used to help visualize the different components in your application and how they interact with one another and how they are registered in the system.

In order to get a image from this you must have the following packages installed:

- `networkx`
- `pygraphviz`
- `matplotlib`

You can install the required dependencies via:

```
pip install matplotlib networkx pygraphviz
```

Example:

```
>>> from circuits import Component, Debugger
>>> from circuits.net.events import write
>>> from circuits.net.sockets import TCPServer
>>>
>>> class EchoServer(Component):
...     def init(self, host="0.0.0.0", port=8000):
```

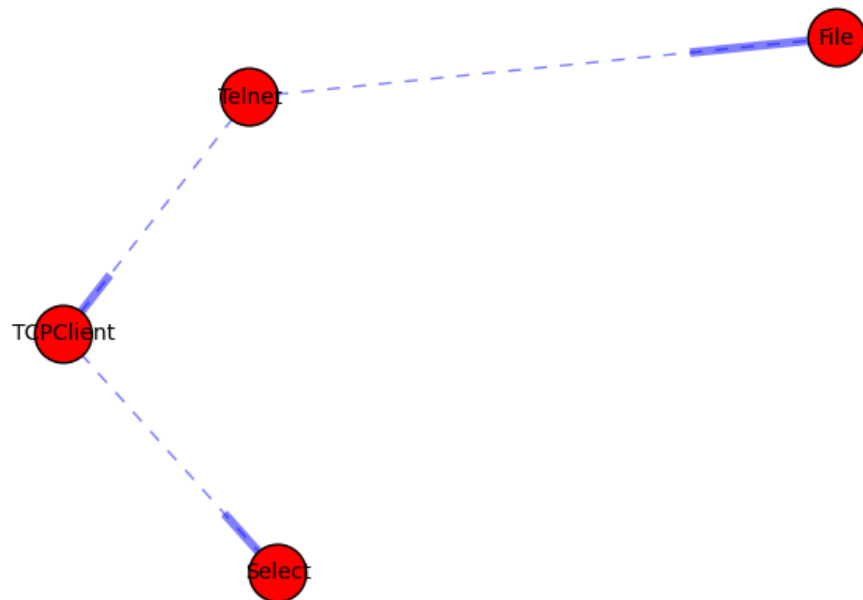
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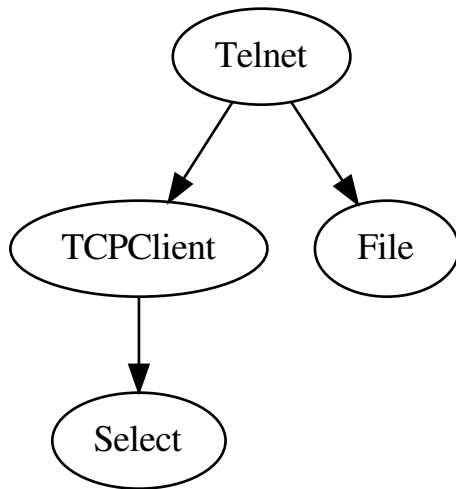
```
...         TCPServer((host, port)).register(self)
...         Debugger().register(self)
...     def read(self, sock, data):
...         self.fire(write(sock, data))
...
>>> server = EchoServer()
>>>
>>> from circuits.tools import graph
>>> print(graph(server))
* <EchoServer/* 784:MainThread (queued=2) [S]>
* <TCPServer/server 784:MainThread (queued=0) [S]>
* <Debugger/* 784:MainThread (queued=0) [S]>
```

An output image will be saved to your current working directory and by called <name>.png where <name> is the name of the top-level component in your application of the value you pass to the name= keyword argument of ~circuits.tools.graph.

Example output of telnet Example:



And its DOT Graph:



2.4 circuits.web User Manual

2.4.1 Introduction

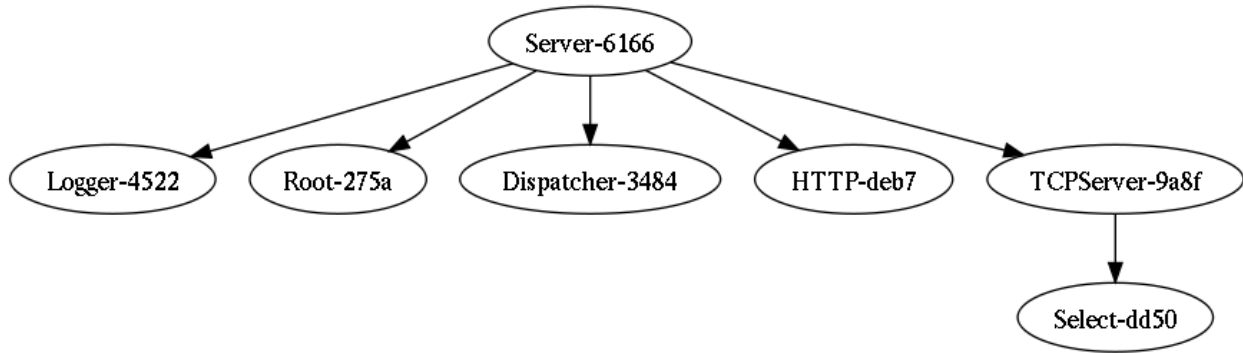
circuits.web is a set of components for building high performance HTTP/1.1 and WSGI/1.0 compliant web applications. These components make it easy to rapidly develop rich, scalable web applications with minimal effort.

circuits.web borrows from

- [CherryPy](#)
- BaseHTTPServer (*Python std. lib*)
- wsgiref (*Python std. lib*)

2.4.2 Getting Started

Just like any application or system built with circuits, a circuits.web application follows the standard Component based design and structure whereby functionality is encapsulated in components. circuits.web itself is designed and built in this fashion. For example a circuits.web Server's structure looks like this:



To illustrate the basic steps, we will demonstrate developing your classical “Hello World!” applications in a web-based way with `circuits.web`

To get started, we first import the necessary components:

```
from circuits.web import Server, Controller
```

Next we define our first Controller with a single Request Handler defined as our index. We simply return “Hello World!” as the response for our Request Handler.

```
class Root(Controller):  
    def index(self):  
        return "Hello World!"
```

This completes our simple web application which will respond with “Hello World!” when anyone accesses it.

Admittedly this is a stupidly simple web application! But circuits.web is very powerful and plays nice with other tools.

Now we need to run the application:

```
(Server(8000) + Root()).run()
```

That’s it! Navigate to: <http://127.0.0.1:8000/> and see the result.

Here’s the complete code:

```
1 from circuits.web import Server, Controller  
2  
3 class Root(Controller):  
4  
5     def index(self):  
6         return "Hello World!"  
7  
8 (Server(8000) + Root()).run()
```

Have fun!

2.4.3 Features

`circuits.web` is not a **Full Stack** or **High Level** web framework, rather it is more closely aligned with `CherryPy` and offers enough functionality to make quickly developing web applications easy and as flexible as possible.

`circuits.web` does not provide high level features such as:

- Templating

- Database access
- Form Validation
- Model View Controller
- Object Relational Mapper

The functionality that `circuits.web` **does** provide ensures that `circuits.web` is fully HTTP/1.1 and WSGI/1.0 compliant and offers all the essential tools you need to build your web application or website.

To demonstrate each feature, we’re going to use the classical “Hello World!” example as demonstrated earlier in *Getting Started*.

Here’s the code again for easy reference:

```

1 from circuits.web import Server, Controller
2
3
4 class Root(Controller):
5
6     def index(self):
7         return "Hello World!"
8
9
10 (Server(8000) + Root()).run()
```

Logging

`circuits.web`’s *Logger* component allows you to add logging support compatible with Apache log file formats to your web application.

To use the *Logger* simply add it to your application:

```
(Server(8000) + Logger() + Root()).run()
```

Example Log Output:

```

127.0.0.1 - - [05/Apr/2014:10:13:01] "GET / HTTP/1.1" 200 12 "" "curl/7.35.0"
127.0.0.1 - - [05/Apr/2014:10:13:02] "GET /docs/build/html/index.html HTTP/1.1" 200_
↪22402 "" "curl/7.35.0"
```

Cookies

Access to cookies are provided through the *Request* Object which holds data about the request. The attribute `cookie` is provided as part of the *Request* Object. It is a dict-like object, an instance of `Cookie.SimpleCookie` from the python standard library.

To demonstrate “Using Cookies” we’ll write a very simple application that remembers who we are:

If a cookie **name** is found, display “Hello <name>!”. Otherwise, display “Hello World!” If an argument is given or a query parameter **name** is given, store this as the **name** for the cookie. Here’s how we do it:

```

1 from circuits.web import Server, Controller
2
3
4 class Root(Controller):
5
```

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```
6  def index(self, name=None):
7      if name:
8          self.cookie["name"] = name
9      else:
10         name = self.cookie.get("name", None)
11         name = "World!" if name is None else name.value
12
13     return "Hello {0:s}!".format(name)
14
15
16 (Server(8000) + Root()).run()
```

Note: To access the actual value of a cookie use the `.value` attribute.

Warning: Cookies can be vulnerable to XSS (*Cross Site Scripting*) attacks so use them at your own risk. See: http://en.wikipedia.org/wiki/Cross-site_scripting#Cookie_security

Dispatchers

circuits.web provides several dispatchers in the `dispatchers` module. Most of these are available directly from the circuits.web namespace by simply importing the required “dispatcher” from circuits.web.

Example:

```
from circuits.web import Static
```

The most important “dispatcher” is the default `Dispatcher` used by the circuits.web `Server` to dispatch incoming requests onto a channel mapping (*remember that circuits is event-driven and uses channels*), quite similar to that of CherryPy or any other web framework that supports object traversal.

Normally you don’t have to worry about any of the details of the default `Dispatcher` nor do you have to import it or use it in any way as it’s already included as part of the circuits.web `Server` Component structure.

Static

The `Static` “dispatcher” is used for serving static resources/files in your application. To use this, simply add it to your application. It takes some optional configuration which affects it’s behavior.

The simplest example (*as per our Base Example*):

```
(Server(8000) + Static() + Root()).run()
```

This will serve up files in the *current directory* as static resources.

Note: This may override your `index` request handler of your top-most (Root) `Controller`. As this might be undesirable and it’s normally common to serve static resources via a different path and even have them stored in a separate physical file path, you can configure the Static “dispatcher”.

Static files stored in `/home/joe/www/`:

```
(Server(8000) + Static(docroot="/home/joe/www/") + Root()).run()
```

Static files stored in `/home/joe/www/` **and** we want them served up as `/static` URI(s):

```
(Server(8000) + Static("/static", docroot="/home/joe/www/") + Root()).run()
```

Dispatcher

The *Dispatcher* (the default) is used to dispatch requests and map them onto channels with a similar URL Mapping as CherryPy's. A set of "paths" are maintained by the Dispatcher as Controller(s) are registered to the system or unregistered from it. A channel mapping is found by traversing the set of known paths (*Controller(s)*) and successively matching parts of the path (*split by /*) until a suitable Controller and Request Handler is found. If no Request Handler is found that matches but there is a "default" Request Handler, it is used.

This Dispatcher also included support for matching against HTTP methods:

- GET
- POST
- PUT
- DELETE.

Here are some examples:

```
1 class Root(Controller):
2
3     def index(self):
4         return "Hello World!"
5
6     def foo(self, arg1, arg2, arg3):
7         return "Foo: %r, %r, %r" % (arg1, arg2, arg3)
8
9     def bar(self, kwarg1="foo", kwarg2="bar"):
10        return "Bar: kwarg1=%r, kwarg2=%r" % (kwarg1, kwarg2)
11
12    def foobar(self, arg1, kwarg1="foo"):
13        return "FooBar: %r, kwarg1=%r" % (arg1, kwarg1)
```

With the following requests:

```
http://127.0.0.1:8000/
http://127.0.0.1:8000/foo/1/2/3
http://127.0.0.1:8000/bar?kwarg1=1
http://127.0.0.1:8000/bar?kwarg1=1&kwarg=2
http://127.0.0.1:8000/foobar/1
http://127.0.0.1:8000/foobar/1?kwarg1=1
```

The following output is produced:

```
Hello World!
Foo: '1', '2', '3'
Bar: kwarg1='1', kwarg2='bar'
Bar: kwarg1='1', kwarg2='bar'
FooBar: '1', kwarg1='foo'
FooBar: '1', kwarg1='1'
```

This demonstrates how the Dispatcher handles basic paths and how it handles extra parts of a path as well as the query string. These are essentially translated into arguments and keyword arguments.

To define a Request Handler that is specifically for the HTTP POST method, simply define a Request Handler like:

```
1 class Root(Controller):
2
3     def index(self):
4         return "Hello World!"
5
6
7 class Test(Controller):
8
9     channel = "/test"
10
11     def POST(self, *args, **kwargs): """
12         return "%r %r" % (args, kwargs)
```

This will handles POST requests to “/test”, which brings us to the final point of creating URL structures in your application. As seen above to create a sub-structure of Request Handlers (*a tree*) simply create another *Controller* Component giving it a different channel and add it to the system along with your existing Controller(s).

Warning: All public methods defined in your subclass from `:class:`~BaseController`` whereby you have to explicitly use `expose()` or use `@expose(False)` to decorate a public method as **NOT Exposed** or simply prefix the desired method with an underscore (e.g: `def _foo(...):`).

VirtualHosts

The *VirtualHosts* “dispatcher” allows you to serves up different parts of your application for different “virtual” hosts.

Consider for example you have the following hosts defined:

```
localhost
foo.localhost
bar.localhost
```

You want to display something different on the default domain name “localhost” and something different for each of the sub-domains “foo.localhost” and “bar.localhost”.

To do this, we use the VirtualHosts “dispatcher”:

```
1 from circuits.web import Server, Controller, VirtualHosts
2
3
4 class Root(Controller):
5
6     def index(self):
7         return "I am the main vhost"
8
9
10 class Foo(Controller):
11
12     channel = "/foo"
```

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```

13
14     def index(self):
15         return "I am foo."
16
17
18 class Bar(Controller):
19
20     channel = "/bar"
21
22     def index(self):
23         return "I am bar."
24
25
26 domains = {
27     "foo.localdomain:8000": "foo",
28     "bar.localdomain:8000": "bar",
29 }
30
31
32 (Server(8000) + VirtualHosts(domains) + Root() + Foo() + Bar()).run()

```

With the following requests:

```

http://localdomain:8000/
http://foo.localdomain:8000/
http://bar.localdomain:8000/

```

The following output is produced:

```

I am the main vhost
I am foo.
I am bar.

```

The argument **domains** pasted to `VirtualHosts`' constructor is a mapping (*dict*) of: domain -> channel

XMLRPC

The *XMLRPC* “dispatcher” provides a `circuits.web` application with the capability of serving up RPC Requests encoded in XML (XML-RPC).

Without going into too much details (*if you're using any kind of RPC “dispatcher” you should know what you're doing...*), here is a simple example:

```

1 from circuits import Component
2 from circuits.web import Server, Logger, XMLRPC
3
4
5 class Test(Component):
6
7     def foo(self, a, b, c):
8         return a, b, c
9
10
11 (Server(8000) + Logger() + XMLRPC() + Test()).run()

```

Here is a simple interactive session:

```
>>> import xmlrpclib
>>> xmlrpc = xmlrpclib.ServerProxy("http://127.0.0.1:8000/rpc/")
>>> xmlrpc.foo(1, 2, 3)
[1, 2, 3]
>>>
```

JSONRPC

The *JSONRPC* “dispatcher” is identical in functionality to the *XMLRPC* “dispatcher”.

Example:

```
1 from circuits import Component
2 from circuits.web import Server, Logger, JSONRPC
3
4
5 class Test(Component):
6
7     def foo(self, a, b, c):
8         return a, b, c
9
10
11 (Server(8000) + Logger() + JSONRPC() + Test()).run()
```

Interactive session (requires the *jsonrpclib* <<https://pypi.python.org/pypi/jsonrpc>> ‘_ library):

```
>>> import jsonrpclib
>>> jsonrpc = jsonrpclib.ServerProxy("http://127.0.0.1:8000/rpc/")
>>> jsonrpc.foo(1, 2, 3)
{'result': [1, 2, 3], 'version': '1.1', 'id': 2, 'error': None}
>>>
```

Caching

circuits.web includes all the usual **Cache Control**, **Expires** and **ETag** caching mechanisms.

For simple expires style caching use the `expires()` tool from *circuits.web.tools*.

Example:

```
1 from circuits.web import Server, Controller
2
3
4 class Root(Controller):
5
6     def index(self):
7         self.expires(3600)
8         return "Hello World!"
9
10
11 (Server(8000) + Root()).run()
```

For other caching mechanisms and validation please refer to the *circuits.web.tools* documentation.

See in particular:

- `expires()`

- `validate_since()`

Note: In the example above we used `self.expires(3600)` which is just a convenience method built into the *Controller*. The *Controller* has other such convenience methods such as `.uri`, `.forbidden()`, `.redirect()`, `.notfound()`, `.serve_file()`, `.serve_download()` and `.expires()`.

These are just wrappers around *tools* and *events*.

Compression

`circuits.web` includes the necessary low-level tools in order to achieve compression. These tools are provided as a set of functions that can be applied to the response before it is sent to the client.

Here's how you can create a simple Component that enables compression in your web application or website.

```

1  from circuits import handler, Component
2
3  from circuits.web.tools import gzip
4  from circuits.web import Server, Controller, Logger
5
6
7  class Gzip(Component):
8
9      @handler("response", priority=1.0)
10     def compress_response(self, event, response):
11         event[0] = gzip(response)
12
13
14  class Root(Controller):
15
16     def index(self):
17         return "Hello World!"
18
19
20  (Server(8000) + Gzip() + Root()).run()
```

Please refer to the documentation for further details:

- `tools.gzip()`
- `utils.compress()`

Authentication

`circuits.web` provides both HTTP Plain and Digest Authentication provided by the functions in `circuits.web.tools`:

- `tools.basic_auth()`
- `tools.check_auth()`
- `tools.digest_auth()`

The first 2 arguments are always (*as with most circuits.web tools*):

- `(request, response)`

An example demonstrating the use of “Basic Auth”:

```
1 from circuits.web import Server, Controller
2 from circuits.web.tools import check_auth, basic_auth
3
4
5 class Root(Controller):
6
7     def index(self):
8         realm = "Test"
9         users = {"admin": "admin"}
10        encrypt = str
11
12        if check_auth(self.request, self.response, realm, users, encrypt):
13            return "Hello %s" % self.request.login
14
15        return basic_auth(self.request, self.response, realm, users, encrypt)
16
17
18 (Server(8000) + Root()).run()
```

For “Digest Auth”:

```
1 from circuits.web import Server, Controller
2 from circuits.web.tools import check_auth, digest_auth
3
4
5 class Root(Controller):
6
7     def index(self):
8         realm = "Test"
9         users = {"admin": "admin"}
10        encrypt = str
11
12        if check_auth(self.request, self.response, realm, users, encrypt):
13            return "Hello %s" % self.request.login
14
15        return digest_auth(self.request, self.response, realm, users, encrypt)
16
17
18 (Server(8000) + Root()).run()
```

Session Handling

Session Handling in circuits.web is very similar to Cookies. A dict-like object called **.session** is attached to every Request Object during the life-cycle of that request. Internally a Cookie named **circuits.session** is set in the response.

Rewriting the Cookie Example to use a session instead:

```
1 from circuits.web import Server, Controller, Sessions
2
3
4 class Root(Controller):
5
6     def index(self, name=None):
7         if name:
8             self.session["name"] = name
9         else:
```

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```

10         name = self.session.get("name", "World!")
11
12         return "Hello %s!" % name
13
14
15 (Server(8000) + Sessions() + Root()).run()

```

Note: The only Session Handling provided is a temporary in-memory based one and will not persist. No future Session Handling components are planned. For persistent data you should use some kind of Database.

2.4.4 How To Guides

These “How To” guides will steer you in the right direction for common aspects of modern web applications and website design.

How Do I: Use a Templating Engine

circuits.web tries to stay out of your way as much as possible and doesn’t impose any restrictions on what external libraries and tools you can use throughout your web application or website. As such you can use any template language/engine you wish.

Example: Using Mako

This basic example of using the Mako Templating Language. First a TemplateLookup instance is created. Finally a function called `render(name, **d)` is created that is used by Request Handlers to render a given template and apply data to it.

Here is the basic example:

```

1  #!/usr/bin/env python
2
3  import os
4
5
6  import mako
7  from mako.lookup import TemplateLookup
8
9
10 from circuits.web import Server, Controller
11
12
13 templates = TemplateLookup(
14     directories=[os.path.join(os.path.dirname(__file__), "tpl")],
15     module_directory="/tmp",
16     output_encoding="utf-8"
17 )
18
19
20 def render(name, **d): """
21     try:

```

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```

22         return templates.get_template(name).render(**d) ***
23     except:
24         return mako.exceptions.html_error_template().render()
25
26
27 class Root(Controller):
28
29     def index(self):
30         return render("index.html")
31
32     def submit(self, firstName, lastName):
33         msg = "Thank you %s %s" % (firstName, lastName)
34         return render("index.html", message=msg)
35
36
37 (Server(8000) + Root()).run()

```

Other Examples

Other Templating engines will be quite similar to integrate.

How Do I: Integrate with a Database

Warning: Using databases in an asynchronous framework is problematic because most database implementations don't support asynchronous I/O operations.

Generally the solution is to use threading to hand off database operations to a separate thread.

Here are some ways to help integrate databases into your application:

1. Ensure your queries are optimized and do not block for extensive periods of time.
2. Use a library like [SQLAlchemy](#) that supports multi-threaded database operations to help prevent your circuits.web web application from blocking.
3. *Optionally* take advantage of the `Worker` component to fire `task` events wrapping database calls in a thread or process pool. You can then use the `call()` and `wait()` synchronization primitives to help with the control flow of your requests and responses.

Another way you can help improve performance is by load balancing across multiple backends of your web application. Using things like [haproxy](#) or [nginx](#) for load balancing can really help.

How Do I: Use WebSockets

Since the `WebSocketDispatcher` is a circuits.web “dispatcher” it's quite easy to integrate into your web application. Here's a simple trivial example:

```

1  #!/usr/bin/env python
2
3  from circuits.net.events import write
4  from circuits import Component, Debugger
5  from circuits.web.dispatchers import WebSocketsDispatcher

```

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```

6 from circuits.web import Controller, Logger, Server, Static
7
8
9 class Echo(Component):
10
11     channel = "wsserver"
12
13     def read(self, sock, data):
14         self.fireEvent(write(sock, "Received: " + data))
15
16
17 class Root(Controller):
18
19     def index(self):
20         return "Hello World!"
21
22
23 app = Server(("0.0.0.0", 8000))
24 Debugger().register(app)
25 Static().register(app)
26 Echo().register(app)
27 Root().register(app)
28 Logger().register(app)
29 WebSocketsDispatcher("/websocket").register(app)
30 app.run()

```

See the `circuits.web` examples.

How do I: Build a Simple Form

`circuits.web` parses all POST data as a request comes through and creates a dictionary of kwargs (Keyword Arguments) that are passed to Request Handlers.

Here is a simple example of handling form data:

```

1 #!/usr/bin/env python
2
3 from circuits.web import Server, Controller
4
5
6 class Root(Controller):
7
8     html = """\
9 <html>
10 <head>
11   <title>Basic Form Handling</title>
12 </head>
13 <body>
14   <h1>Basic Form Handling</h1>
15   <p>
16     Example of using
17     <a href="http://code.google.com/p/circuits/">circuits</a> and it's
18     <b>Web Components</b> to build a simple web application that handles
19     some basic form data.
20   </p>
21   <form action="submit" method="POST">

```

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```

22     <table border="0" rules="none">
23         <tr>
24             <td>First Name:</td>
25             <td><input type="text" name="firstName"></td>
26         </tr>
27         <tr>
28             <td>Last Name:</td>
29             <td><input type="text" name="lastName"></td>
30         </tr>
31         <tr>
32             <td colspan="2" align="center">
33                 <input type="submit" value="Submit">
34             </td>
35         </tr>
36     </table>
37 </form>
38 </body>
39 </html>"""
40
41
42     def index(self):
43         return self.html
44
45     def submit(self, firstName, lastName):
46         return "Hello %s %s" % (firstName, lastName)
47
48
49 (Server(8000) + Root()).run(

```

How Do I: Upload a File

You can easily handle File Uploads as well using the same techniques as above. Basically the “name” you give your `<input>` tag of type=”file” will get passed as the Keyword Argument to your Request Handler. It has the following two attributes:

```
.filename - The name of the uploaded file.
.value - The contents of the uploaded file.
```

Here’s the code!

```

1  #!/usr/bin/env python
2
3  from circuits.web import Server, Controller
4
5
6  UPLOAD_FORM = """
7  <html>
8      <head>
9          <title>Upload Form</title>
10     </head>
11     <body>
12         <h1>Upload Form</h1>
13         <form method="POST" action="/" enctype="multipart/form-data">
14             Description: <input type="text" name="desc"><br>
15             <input type="file" name="file">

```

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```

16     <input type="submit" value="Submit">
17     </form>
18     </body>
19 </html>
20 """
21
22 UPLOADED_FILE = """
23 <html>
24 <head>
25     <title>Uploaded File</title>
26 </head>
27 <body>
28     <h1>Uploaded File</h1>
29     <p>
30         Filename: %s<br>
31         Description: %s
32     </p>
33     <p><b>File Contents:</b></p>
34     <pre>
35         %s
36     </pre>
37 </body>
38 </html>
39 """
40
41
42 class Root(Controller):
43
44     def index(self, file=None, desc=""):
45         if file is None:
46             return UPLOAD_FORM
47         else:
48             filename = file.filename
49             return UPLOADED_FILE % (file.filename, desc, file.value)
50
51
52 (Server(8000) + Root()).run()

```

circuits.web automatically handles form and file uploads and gives you access to the uploaded file via arguments to the request handler after they've been processed by the dispatcher.

How Do I: Integrate with WSGI Applications

Integrating with other WSGI Applications is quite easy to do. Simply add in an instance of the *Gateway* component into your circuits.web application.

Example:

```

1  #!/usr/bin/env python
2
3  from circuits.web.wsgi import Gateway
4  from circuits.web import Controller, Server
5
6
7  def foo(environ, start_response):
8      start_response("200 OK", [("Content-Type", "text/plain")])

```

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```

9     return ["Foo!"]
10
11
12 class Root(Controller):
13     """App Rot"""
14
15     def index(self):
16         return "Hello World!"
17
18
19 app = Server(("0.0.0.0", 10000))
20 Root().register(app)
21 Gateway({"foo": foo}).register(app)
22 app.run()

```

The `apps` argument of the `Gateway` component takes a key/value pair of `path -> callable` (a Python dictionary) that maps each URI to a given WSGI callable.

How Do I: Deploy with Apache and mod_wsgi

Here's how to deploy your new Circuits powered Web Application on Apache using `mod_wsgi`.

Let's say you have a Web Hosting account with some provider.

- Your Username is: "joblogs"
- Your URL is: <http://example.com/~joblogs/>
- Your Docroot is: `/home/joblogs/www/`

Configuring Apache

The first step is to add in the following `.htaccess` file to tell Apache that we want any and all requests to <http://example.com/~joblogs/> to be served up by our `circuits.web` application.

Created the `.htaccess` file in your **Docroot**:

```

ReWriteEngine On
ReWriteCond %{REQUEST_FILENAME} !-f
ReWriteCond %{REQUEST_FILENAME} !-d
RewriteRule ^(.*)$ /~joblogs/index.wsgi/$1 [QSA,PT,L]

```

Running your Application with Apache/mod_wsgi

To get your Web Application working and deployed on Apache using `mod_wsgi`, you need to make a few changes to your code. Based on our Basic Hello World example earlier, we modify it to the following:

```

1  #!/usr/bin/env python
2
3  from circuits.web import Controller
4  from circuits.web.wsgi import Application
5
6
7  class Root(Controller):

```

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```

8
9     def index(self):
10         return "Hello World!"
11
12
13 application = Application() + Root()

```

That's it! To run this, save it as `index.wsgi` and place it in your Web Root (`public-html` or `www` directory) as per the above guidelines and point your favorite Web Browser to: <http://example.com/~joeblogs/>

Note: It is recommended that you actually use a reverse proxy setup for deploying circuits.web web application so that you don't lose the advantages and functionality of using an event-driven component architecture in your web apps.

In **production** you should use a load balance and reverse proxy combination for best performance.

2.4.5 Miscellaneous

Writing Tools

Most of the internal tools used by circuits.web in `circuits.web.tools` are simply functions that modify the Request or Response objects in some way or another... We won't be covering that here... What we will cover is how to build simple tools that do something to the Request or Response along its life-cycle.

Here is a simple example of a tool that uses the `pytidylib` library to tidy up the HTML output before it gets sent back to the requesting client.

Code:

```

1  #!/usr/bin/env python
2  from tidylib import tidy_document
3
4  from circuits import Component
5
6  class Tidy(Component):
7
8      channel = "http"
9
10     def response(self, response):
11         document, errors = tidy_document("".join(response.body))
12         response.body = document
13 Usage:
14
15 (Server(8000) + Tidy() + Root()).run()

```

How it works:

This tool works by intercepting the Response Event on the “response” channel of the “http” target (*or Component*). For more information about the life cycle of Request and Response events, their channels and where and how they can be intercepted to perform various tasks read the Request/Response Life Cycle section.

Writing Dispatchers

In circuits.web writing a custom “dispatcher” is only a matter of writing a Component that listens for incoming Request events on the “request” channel of the “web” target. The simplest kind of “dispatcher” is one that simply modifies the request.path in some way. To demonstrate this we’ll illustrate and describe how the !VirtualHosts “dispatcher” works.

VirtualHosts code:

```
1 class VirtualHosts(Component):
2
3     channel = "web"
4
5     def __init__(self, domains):
6         super(VirtualHosts, self).__init__()
7
8         self.domains = domains
9
10    @handler("request", filter=True, priority=1)
11    def request(self, event, request, response):
12        path = request.path.strip("/")
13
14        header = request.headers.get
15        domain = header("X-Forwarded-Host", header("Host", ""))
16        prefix = self.domains.get(domain, "")
17
18        if prefix:
19            path = _urljoin("/%s/" % prefix, path)
20            request.path = path
```

The important thing here to note is the Event Handler listening on the appropriate channel and the request.path being modified appropriately.

You’ll also note that in [source:circuits/web/dispatchers.py] all of the dispatchers have a set priority. These priorities are defined as:

```
$ grin "priority" circuits/web/dispatchers/
circuits/web/dispatchers/dispatcher.py:
  92 :      @handler("request", filter=True, priority=0.1)
circuits/web/dispatchers/jsonrpc.py:
  38 :      @handler("request", filter=True, priority=0.2)
circuits/web/dispatchers/static.py:
  59 :      @handler("request", filter=True, priority=0.9)
circuits/web/dispatchers/virtualhosts.py:
  49 :      @handler("request", filter=True, priority=1.0)
circuits/web/dispatchers/websockets.py:
  53 :      @handler("request", filter=True, priority=0.2)
circuits/web/dispatchers/xmlrpc.py:
  36 :      @handler("request", filter=True, priority=0.2)
```

in web applications that use multiple dispatchers these priorities set precedences for each “dispatcher” over another in terms of who’s handling the Request Event before the other.

Note: Some dispatchers are designed to filter the Request Event and prevent it from being processed by other dispatchers in the system.

2.5 API Documentation

2.5.1 circuits package

Subpackages

circuits.app package

Submodules

circuits.app.daemon module

Daemon Component

Component to daemonize a system into the background and detach it from its controlling PTY. Supports PID file writing, logging stdin, stdout and stderr and changing the current working directory.

```
class circuits.app.daemon.Daemon(*args, **kwargs)
```

Bases: *circuits.core.components.Component*

Daemon Component

Parameters

- **pidfile**(*str or unicode*) – .pid filename
- **stdin**(*str or unicode*) – filename to log stdin
- **stdout**(*str or unicode*) – filename to log stdout
- **stderr**(*str or unicode*) – filename to log stderr

initializes x; see x.__class__.__doc__ for signature

```
channel = 'daemon'
```

```
daemonize()
```

```
deletepid()
```

```
init(pidfile, path='/', stdin=None, stdout=None, stderr=None, channel='daemon')
```

```
on_started(component)
```

```
registered(component, manager)
```

```
writepid()
```

```
class circuits.app.daemon.daemonize(*args, **kwargs)
```

Bases: *circuits.core.events.Event*

daemonize Event

An event is a message send to one or more channels. It is eventually dispatched to all components that have handlers for one of the channels and the event type.

All normal arguments and keyword arguments passed to the constructor of an event are passed on to the handler. When declaring a handler, its argument list must therefore match the arguments used for creating the event.

Every event has a `name` attribute that is used for matching the event with the handlers.

Variables

- **channels** – an optional attribute that may be set before firing the event. If defined (usually as a class variable), the attribute specifies the channels that the event should be delivered to as a tuple. This overrides the default behavior of sending the event to the firing component’s channel.

When an event is fired, the value in this attribute is replaced for the instance with the channels that the event is actually sent to. This information may be used e.g. when the event is passed as a parameter to a handler.

- **value** – this is a `circuits.core.values.Value` object that holds the results returned by the handlers invoked for the event.
- **success** – if this optional attribute is set to `True`, an associated event `success` (original name with “_success” appended) will automatically be fired when all handlers for the event have been invoked successfully.
- **success_channels** – the success event is, by default, delivered to same channels as the successfully dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.
- **complete** – if this optional attribute is set to `True`, an associated event `complete` (original name with “_complete” appended) will automatically be fired when all handlers for the event and all events fired by these handlers (recursively) have been invoked successfully.
- **complete_channels** – the complete event is, by default, delivered to same channels as the initially dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

```
class circuits.app.daemon.daemonized(*args, **kwargs)
```

Bases: `circuits.core.events.Event`

daemonized Event

An event is a message send to one or more channels. It is eventually dispatched to all components that have handlers for one of the channels and the event type.

All normal arguments and keyword arguments passed to the constructor of an event are passed on to the handler. When declaring a handler, its argument list must therefore match the arguments used for creating the event.

Every event has a `name` attribute that is used for matching the event with the handlers.

Variables

- **channels** – an optional attribute that may be set before firing the event. If defined (usually as a class variable), the attribute specifies the channels that the event should be delivered to as a tuple. This overrides the default behavior of sending the event to the firing component’s channel.

When an event is fired, the value in this attribute is replaced for the instance with the channels that the event is actually sent to. This information may be used e.g. when the event is passed as a parameter to a handler.

- **value** – this is a `circuits.core.values.Value` object that holds the results returned by the handlers invoked for the event.
- **success** – if this optional attribute is set to `True`, an associated event `success` (original name with “_success” appended) will automatically be fired when all handlers for the event have been invoked successfully.
- **success_channels** – the success event is, by default, delivered to same channels as the successfully dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

- **complete** – if this optional attribute is set to `True`, an associated event `complete` (original name with “_complete” appended) will automatically be fired when all handlers for the event and all events fired by these handlers (recursively) have been invoked successfully.
- **complete_channels** – the complete event is, by default, delivered to same channels as the initially dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

```
class circuits.app.daemon.deletepid(*args, **kwargs)
```

Bases: `circuits.core.events.Event`

“deletepid Event

An event is a message send to one or more channels. It is eventually dispatched to all components that have handlers for one of the channels and the event type.

All normal arguments and keyword arguments passed to the constructor of an event are passed on to the handler. When declaring a handler, its argument list must therefore match the arguments used for creating the event.

Every event has a `name` attribute that is used for matching the event with the handlers.

Variables

- **channels** – an optional attribute that may be set before firing the event. If defined (usually as a class variable), the attribute specifies the channels that the event should be delivered to as a tuple. This overrides the default behavior of sending the event to the firing component’s channel.

When an event is fired, the value in this attribute is replaced for the instance with the channels that the event is actually sent to. This information may be used e.g. when the event is passed as a parameter to a handler.

- **value** – this is a `circuits.core.values.Value` object that holds the results returned by the handlers invoked for the event.
- **success** – if this optional attribute is set to `True`, an associated event `success` (original name with “_success” appended) will automatically be fired when all handlers for the event have been invoked successfully.
- **success_channels** – the success event is, by default, delivered to same channels as the successfully dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.
- **complete** – if this optional attribute is set to `True`, an associated event `complete` (original name with “_complete” appended) will automatically be fired when all handlers for the event and all events fired by these handlers (recursively) have been invoked successfully.
- **complete_channels** – the complete event is, by default, delivered to same channels as the initially dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

```
class circuits.app.daemon.writepid(*args, **kwargs)
```

Bases: `circuits.core.events.Event`

“writepid Event

An event is a message send to one or more channels. It is eventually dispatched to all components that have handlers for one of the channels and the event type.

All normal arguments and keyword arguments passed to the constructor of an event are passed on to the handler. When declaring a handler, its argument list must therefore match the arguments used for creating the event.

Every event has a `name` attribute that is used for matching the event with the handlers.

Variables

- **channels** – an optional attribute that may be set before firing the event. If defined (usually as a class variable), the attribute specifies the channels that the event should be delivered to as a tuple. This overrides the default behavior of sending the event to the firing component’s channel.

When an event is fired, the value in this attribute is replaced for the instance with the channels that the event is actually sent to. This information may be used e.g. when the event is passed as a parameter to a handler.

- **value** – this is a `circuits.core.values.Value` object that holds the results returned by the handlers invoked for the event.
- **success** – if this optional attribute is set to `True`, an associated event `success` (original name with “_success” appended) will automatically be fired when all handlers for the event have been invoked successfully.
- **success_channels** – the success event is, by default, delivered to same channels as the successfully dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.
- **complete** – if this optional attribute is set to `True`, an associated event `complete` (original name with “_complete” appended) will automatically be fired when all handlers for the event and all events fired by these handlers (recursively) have been invoked successfully.
- **complete_channels** – the complete event is, by default, delivered to same channels as the initially dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

Module contents

Application Components

Contains various components useful for application development and tasks common to applications.

```
class circuits.app.Daemon(*args, **kwargs)
    Bases: circuits.core.components.Component
```

Daemon Component

Parameters

- **pidfile** (*str or unicode*) – .pid filename
- **stdin** (*str or unicode*) – filename to log stdin
- **stdout** (*str or unicode*) – filename to log stdout
- **stderr** (*str or unicode*) – filename to log stderr

initializes x; see `x.__class__.__doc__` for signature

```
channel = 'daemon'
```

```
daemonize()
```

```
deletepid()
```

```
init(pidfile, path='/', stdin=None, stdout=None, stderr=None, channel='daemon')
```

```
on_started(component)
```

```
registered(component, manager)
```

```

    writepid()

class circuits.app.DropPrivileges(*args, **kwargs)
    Bases: circuits.core.components.BaseComponent
    initializes x; see x.__class__.__doc__ for signature

    drop_privileges()

    init(user='nobody', group='nobody', umask=63, **kwargs)

    on_ready(server, bind)

```

circuits.core package

Submodules

circuits.core.bridge module

Bridge

The Bridge Component is used for inter-process communications between processes. Bridge is used internally when a Component is started in “process mode” via `circuits.core.manager.start()`. Typically a Pipe is used as the socket transport between two sides of a Bridge (*there must be a :class:‘~Bridge’ instance on both sides*).

```

class circuits.core.bridge.Bridge(*args, **kwargs)
    Bases: circuits.core.components.BaseComponent
    initializes x; see x.__class__.__doc__ for signature

    channel = 'bridge'

    init(socket, channel='bridge')

```

```

class circuits.core.bridge.ipc(event, channel=None)
    Bases: circuits.core.events.Event

    ipc Event

    Send an event to a child/parent process

```

Parameters

- **event** (*circuits.core.events.Event*) – Event to execute remotely.
- **channel** (*str*) – IPC Channel (channel to use on child/parent).

circuits.core.components module

This module defines the BaseComponent and its subclass Component.

```

class circuits.core.components.BaseComponent(*args, **kwargs)
    Bases: circuits.core.manager.Manager

```

This is the base class for all components in a circuits based application. Components can (and should, except for root components) be registered with a parent component.

BaseComponents can declare methods as event handlers using the handler decoration (see `circuits.core.handlers.handler()`). The handlers are invoked for matching events from the component’s channel (specified as the component’s `channel` attribute).

BaseComponents inherit from `circuits.core.manager.Manager`. This provides components with the `circuits.core.manager.Manager.fireEvent()` method that can be used to fire events as the result of some computation.

Apart from the `fireEvent()` method, the Manager nature is important for root components that are started or run.

Variables `channel` – a component can be associated with a specific channel by setting this attribute. This should either be done by specifying a class attribute `channel` in the derived class or by passing a keyword parameter `channel="..."` to `__init__`. If specified, the component's handlers receive events on the specified channel only, and events fired by the component will be sent on the specified channel (this behavior may be overridden, see `Event`, `fireEvent()` and `handler()`). By default, the channel attribute is set to "*", meaning that events are fired on all channels and received from all channels.

initializes x; see x.__class__.__doc__ for signature

```
channel = '*'
```

```
classmethod events()
```

Returns a list of all events this Component listens to

```
classmethod handlers()
```

Returns a list of all event handlers for this Component

```
classmethod handles(*names)
```

Returns True if all names are event handlers of this Component

```
register(parent)
```

Inserts this component in the component tree as a child of the given *parent* node.

Parameters `parent` (*Manager*) – the parent component after registration has completed.

This method fires a `Registered` event to inform other components in the tree about the new member.

```
unregister()
```

Removes this component from the component tree.

Removing a component from the component tree is a two stage process. First, the component is marked as to be removed, which prevents it from receiving further events, and a `prepare_unregister` event is fired. This allows other components to e.g. release references to the component to be removed before it is actually removed from the component tree.

After the processing of the `prepare_unregister` event has completed, the component is removed from the tree and an `unregistered` event is fired.

```
unregister_pending
```

```
class circuits.core.components.Component(*args, **kwargs)
```

Bases: `circuits.core.components.BaseComponent`

initializes x; see x.__class__.__doc__ for signature

```
class circuits.core.components.prepare_unregister(*args, **kwargs)
```

Bases: `circuits.core.events.Event`

This event is fired when a component is about to be unregistered from the component tree. Unregistering a component actually detaches the complete subtree that the unregistered component is the root of. Components that need to know if they are removed from the main tree (e.g. because they maintain relationships to other components in the tree) handle this event, check if the component being unregistered is one of their ancestors and act accordingly.

Parameters `component` – the component that will be unregistered


```
complete = True
```

```
in_subtree (component)
```

Convenience method that checks if the given *component* is in the subtree that is about to be detached.

circuits.core.debugger module

Debugger component used to debug each event in a system by printing each event to sys.stderr or to a Logger Component instance.

```
class circuits.core.debugger.Debugger (errors=True, events=True, file=None, logger=None,
                                         prefix=None, trim=None, **kwargs)
```

Bases: [circuits.core.components.BaseComponent](#)

Create a new Debugger Component

Creates a new Debugger Component that listens to all events in the system printing each event to sys.stderr or a Logger Component.

Variables

- [IgnoreEvents](#) – list of events (str) to ignore
- [IgnoreChannels](#) – list of channels (str) to ignore
- **enabled** – Enabled/Disabled flag

Parameters **log** – Logger Component instance or None (*default*)

initializes x; see x.__class__.__doc__ for signature

```
IgnoreChannels = []
```

```
IgnoreEvents = ['generate_events']
```

circuits.core.events module

This module defines the basic event class and common events.

```
class circuits.core.events.Event (*args, **kwargs)
```

Bases: object

An event is a message send to one or more channels. It is eventually dispatched to all components that have handlers for one of the channels and the event type.

All normal arguments and keyword arguments passed to the constructor of an event are passed on to the handler. When declaring a handler, its argument list must therefore match the arguments used for creating the event.

Every event has a `name` attribute that is used for matching the event with the handlers.

Variables

- [channels](#) – an optional attribute that may be set before firing the event. If defined (usually as a class variable), the attribute specifies the channels that the event should be delivered to as a tuple. This overrides the default behavior of sending the event to the firing component's channel.

When an event is fired, the value in this attribute is replaced for the instance with the channels that the event is actually sent to. This information may be used e.g. when the event is passed as a parameter to a handler.

- **value** – this is a `circuits.core.values.Value` object that holds the results returned by the handlers invoked for the event.
- **success** – if this optional attribute is set to `True`, an associated event `success` (original name with “_success” appended) will automatically be fired when all handlers for the event have been invoked successfully.
- **success_channels** – the success event is, by default, delivered to same channels as the successfully dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.
- **complete** – if this optional attribute is set to `True`, an associated event `complete` (original name with “_complete” appended) will automatically be fired when all handlers for the event and all events fired by these handlers (recursively) have been invoked successfully.
- **complete_channels** – the complete event is, by default, delivered to same channels as the initially dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

alert_done = False

cancel()

Cancel the event from being processed (if not already)

channels = ()

child(*name*, **args*, ***kwargs*)

complete = False

classmethod create(*_name*, **args*, ***kwargs*)

failure = False

notify = False

parent = None

stop()

Stop further processing of this event

success = False

waitingHandlers = 0

class `circuits.core.events.exception`(*type*, *value*, *traceback*, *handler=None*, *fevent=None*)

Bases: `circuits.core.events.Event`

exception Event

This event is sent for any exceptions that occur during the execution of an event Handler that is not `SystemExit` or `KeyboardInterrupt`.

Parameters

- **type**(*type*) – type of exception
- **value**(*exceptions.Exceptions*) – exception object
- **traceback**(*traceback*) – traceback of exception
- **handler**(*@handler(<method>)*) – handler that raised the exception
- **fevent**(*event*) – event that failed

format_traceback(*traceback*)

class `circuits.core.events.generate_events` (*lock, max_wait*)

Bases: `circuits.core.events.Event`

`generate_events` Event

This Event is sent by the circuits core. All components that generate timed events or events from external sources (e.g. data becoming available) should fire any pending events in their “generate_events” handler.

The handler must either call `stop()` (*preventing other handlers from being called in the same iteration) or must invoke `reduce_time_left()` with parameter 0.

Parameters `max_wait` – maximum time available for generating events.

Components that actually consume time waiting for events to be generated, thus suspending normal execution, must provide a method `resume` that interrupts waiting for events.

lock

reduce_time_left (*time_left*)

Update the time left for generating events. This is typically used by event generators that currently don’t want to generate an event but know that they will within a certain time. By reducing the time left, they make sure that they are reinvoked when the time for generating the event has come (at the latest).

This method can only be used to reduce the time left. If the parameter is larger than the current value of time left, it is ignored.

If the time left is reduced to 0 and the event is currently being handled, the handler’s `resume` method is invoked.

time_left

The time left for generating events. A value less than 0 indicates unlimited time. You should have only one component in your system (usually a poller component) that spends up to “time left” until it generates an event.

class `circuits.core.events.registered` (*component, manager*)

Bases: `circuits.core.events.Event`

`registered` Event

This Event is sent when a Component has registered with another Component or Manager. This Event is only sent if the Component or Manager being registered which is not itself.

Parameters

- **component** (`Component`) – The Component being registered
- **manager** (`Component` or `Manager`) – The Component or Manager being registered with

class `circuits.core.events.signal` (*signo, stack*)

Bases: `circuits.core.events.Event`

`signal` Event

This Event is sent when a Component receives a signal.

Parameters

- **signo** – The signal number received.
- **stack** – The interrupted stack frame.

class `circuits.core.events.started` (*manager*)

Bases: `circuits.core.events.Event`

`started` Event

This Event is sent when a Component or Manager has started running.

Parameters **manager** (*Component or Manager*) – The component or manager that was started

```
class circuits.core.events.stopped(manager)
```

Bases: *circuits.core.events.Event*

stopped Event

This Event is sent when a Component or Manager has stopped running.

Parameters **manager** (*Component or Manager*) – The component or manager that has stopped

```
class circuits.core.events.unregistered(*args, **kwargs)
```

Bases: *circuits.core.events.Event*

unregistered Event

This Event is sent when a Component has been unregistered from its Component or Manager.

An event is a message send to one or more channels. It is eventually dispatched to all components that have handlers for one of the channels and the event type.

All normal arguments and keyword arguments passed to the constructor of an event are passed on to the handler. When declaring a handler, its argument list must therefore match the arguments used for creating the event.

Every event has a `name` attribute that is used for matching the event with the handlers.

Variables

- **channels** – an optional attribute that may be set before firing the event. If defined (usually as a class variable), the attribute specifies the channels that the event should be delivered to as a tuple. This overrides the default behavior of sending the event to the firing component’s channel.

When an event is fired, the value in this attribute is replaced for the instance with the channels that the event is actually sent to. This information may be used e.g. when the event is passed as a parameter to a handler.

- **value** – this is a *circuits.core.values.Value* object that holds the results returned by the handlers invoked for the event.
- **success** – if this optional attribute is set to `True`, an associated event `success` (original name with “_success” appended) will automatically be fired when all handlers for the event have been invoked successfully.
- **success_channels** – the success event is, by default, delivered to same channels as the successfully dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.
- **complete** – if this optional attribute is set to `True`, an associated event `complete` (original name with “_complete” appended) will automatically be fired when all handlers for the event and all events fired by these handlers (recursively) have been invoked successfully.
- **complete_channels** – the complete event is, by default, delivered to same channels as the initially dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

circuits.core.handlers module

This module define the @handler decorator/function and the HandlesType type.

```
class circuits.core.handlers.HandlerMetaClass (name, bases, ns)
    Bases: type
```

```
class circuits.core.handlers.Unknown
    Bases: object
```

Unknown Dummy Component

```
circuits.core.handlers.handler (*names, **kwargs)
    Creates an Event Handler
```

This decorator can be applied to methods of classes derived from `circuits.core.components.BaseComponent`. It marks the method as a handler for the events passed as arguments to the @handler decorator. The events are specified by their name.

The decorated method's arguments must match the arguments passed to the `circuits.core.events.Event` on creation. Optionally, the method may have an additional first argument named *event*. If declared, the event object that caused the handler to be invoked is assigned to it.

By default, the handler is invoked by the component's root *Manager* for events that are propagated on the channel determined by the BaseComponent's *channel* attribute. This may be overridden by specifying a different channel as a keyword parameter of the decorator (*channel=...*).

Keyword argument *priority* influences the order in which handlers for a specific event are invoked. The higher the priority, the earlier the handler is executed.

If you want to override a handler defined in a base class of your component, you must specify *override=True*, else your method becomes an additional handler for the event.

Return value

Normally, the results returned by the handlers for an event are simply collected in the `circuits.core.events.Event`'s *value* attribute. As a special case, a handler may return a `types.GeneratorType`. This signals to the dispatcher that the handler isn't ready to deliver a result yet. Rather, it has interrupted it's execution with a `yield None` statement, thus preserving its current execution state.

The dispatcher saves the returned generator object as a task. All tasks are reexamined (i.e. their `next()` method is invoked) when the pending events have been executed.

This feature avoids an unnecessarily complicated chaining of event handlers. Imagine a handler A that needs the results from firing an event E in order to complete. Then without this feature, the final action of A would be to fire event E, and another handler for an event *SuccessE* would be required to complete handler A's operation, now having the result from invoking E available (actually it's even a bit more complicated).

Using this "suspend" feature, the handler simply fires event E and then yields *None* until e.g. it finds a result in E's *value* attribute. For the simplest scenario, there even is a utility method `circuits.core.manager.Manager.callEvent()` that combines firing and waiting.

```
circuits.core.handlers.reprhandler (handler)
```

circuits.core.helpers module

```
class circuits.core.helpers.FallBackExceptionHandler (*args, **kwargs)
    Bases: circuits.core.components.BaseComponent
```

If there is no handler for error events in the component hierarchy, this component's handler is added automatically. It simply prints the error information on stderr.

initializes x; see x.__class__.__doc__ for signature

class circuits.core.helpers.FallBackGenerator(*args, **kwargs)

Bases: [circuits.core.components.BaseComponent](#)

resume()

Implements the resume method as required from components that handle GenerateEvents.

class circuits.core.helpers.FallBackSignalHandler(*args, **kwargs)

Bases: [circuits.core.components.BaseComponent](#)

If there is no handler for signal events in the component hierarchy, this component's handler is added automatically. It simply terminates the system if the signal is SIGINT or SIGTERM.

initializes x; see x.__class__.__doc__ for signature

circuits.core.loader module

This module implements a generic Loader suitable for dynamically loading components from other modules. This supports loading from local paths, eggs and zip archives. Both setuptools and distribute are fully supported.

class circuits.core.loader.Loader(auto_register=True, init_args=None, init_kwargs=None, paths=None, channel='loader')

Bases: [circuits.core.components.BaseComponent](#)

Create a new Loader Component

Creates a new Loader Component that enables dynamic loading of components from modules either in local paths, eggs or zip archives.

initializes x; see x.__class__.__doc__ for signature

channel = 'loader'

load(name)

circuits.core.manager module

This module defines the Manager class.

class circuits.core.manager.CallValue(value)

Bases: object

class circuits.core.manager.ExceptionWrapper(exception)

Bases: object

extract()

class circuits.core.manager.Manager(*args, **kwargs)

Bases: object

The manager class has two roles. As a base class for component implementation, it provides methods for event and handler management. The method [fireEvent\(\)](#) appends a new event at the end of the event queue for later execution. [waitEvent\(\)](#) suspends the execution of a handler until all handlers for a given event have been invoked. [callEvent\(\)](#) combines the last two methods in a single method.

The methods [addHandler\(\)](#) and [removeHandler\(\)](#) allow handlers for events to be added and removed dynamically. (The more common way to register a handler is to use the [handler\(\)](#) decorator or derive the class from [Component](#).)

In its second role, the *Manager* takes the role of the event executor. Every component hierarchy has a root component that maintains a queue of events. Firing an event effectively means appending it to the event queue maintained by the root manager. The `flush()` method removes all pending events from the queue and, for each event, invokes all the handlers. Usually, `flush()` is indirectly invoked by `run()`.

The manager optionally provides information about the execution of events as automatically generated events. If an *Event* has its `success` attribute set to `True`, the manager fires a *Success* event if all handlers have been executed without error. Note that this event will be enqueued (and dispatched) immediately after the events that have been fired by the event's handlers. So the success event indicates both the successful invocation of all handlers for the event and the processing of the immediate follow-up events fired by those handlers.

Sometimes it is not sufficient to know that an event and its immediate follow-up events have been processed. Rather, it is important to know when all state changes triggered by an event, directly or indirectly, have been performed. This also includes the processing of events that have been fired when invoking the handlers for the follow-up events and the processing of events that have again been fired by those handlers and so on. The completion of the processing of an event and all its direct or indirect follow-up events may be indicated by a *Complete* event. This event is generated by the manager if *Event* has its `complete` attribute set to `True`.

Apart from the event queue, the root manager also maintains a list of tasks, actually Python generators, that are updated when the event queue has been flushed.

initializes `x`; see `x.__class__.__doc__` for signature

addHandler (*f*)

call (*event*, **channels*, ***kwargs*)

Fire the given event to the specified channels and suspend execution until it has been dispatched. This method may only be invoked as argument to a `yield` on the top execution level of a handler (e.g. “`yield self.callEvent(event)`”). It effectively creates and returns a generator that will be invoked by the main loop until the event has been dispatched (see `circuits.core.handlers.handler()`).

callEvent (*event*, **channels*, ***kwargs*)

Fire the given event to the specified channels and suspend execution until it has been dispatched. This method may only be invoked as argument to a `yield` on the top execution level of a handler (e.g. “`yield self.callEvent(event)`”). It effectively creates and returns a generator that will be invoked by the main loop until the event has been dispatched (see `circuits.core.handlers.handler()`).

fire (*event*, **channels*, ***kwargs*)

Fire an event into the system.

Parameters

- **event** – The event that is to be fired.
- **channels** – The channels that this event is delivered on. If no channels are specified, the event is delivered to the channels found in the event's `channel` attribute. If this attribute is not set, the event is delivered to the firing component's channel. And eventually, when set neither, the event is delivered on all channels (“*”).

fireEvent (*event*, **channels*, ***kwargs*)

Fire an event into the system.

Parameters

- **event** – The event that is to be fired.
- **channels** – The channels that this event is delivered on. If no channels are specified, the event is delivered to the channels found in the event's `channel` attribute. If this attribute is not set, the event is delivered to the firing component's channel. And eventually, when set neither, the event is delivered on all channels (“*”).

flush()

Flush all Events in the Event Queue. If called on a manager that is not the root of an object hierarchy, the invocation is delegated to the root manager.

flushEvents()

Flush all Events in the Event Queue. If called on a manager that is not the root of an object hierarchy, the invocation is delegated to the root manager.

getHandlers (*event, channel, **kwargs*)

join()

name

Return the name of this Component/Manager

pid

Return the process id of this Component/Manager

processTask (*event, task, parent=None*)

registerChild (*component*)

registerTask (*g*)

removeHandler (*method, event=None*)

run (*socket=None*)

Run this manager. The method fires the `Started` event and then continuously calls `tick()`.

The method returns when the manager's `stop()` method is invoked.

If invoked by a programs main thread, a signal handler for the `INT` and `TERM` signals is installed. This handler fires the corresponding `Signal` events and then calls `stop()` for the manager.

running

Return the running state of this Component/Manager

start (*process=False, link=None*)

Start a new thread or process that invokes this manager's `run()` method. The invocation of this method returns immediately after the task or process has been started.

stop (*code=None*)

Stop this manager. Invoking this method causes an invocation of `run()` to return.

tick (*timeout=-1*)

Execute all possible actions once. Process all registered tasks and flush the event queue. If the application is running fire a `GenerateEvents` to get new events from sources.

This method is usually invoked from `run()`. It may also be used to build an application specific main loop.

Parameters `timeout` (*float, measuring seconds*) – the maximum waiting time spent in this method. If negative, the method may block until at least one action has been taken.

unregisterChild (*component*)

unregisterTask (*g*)

wait (*event, *channels, **kwargs*)

waitEvent (*event, *channels, **kwargs*)

class `circuits.core.manager.Sleep` (*seconds*)

Bases: `circuits.six.Iterator`

expired**task****exception** `circuits.core.manager.TimeoutError`Bases: `exceptions.Exception`

Raised if wait event timeout occurred

exception `circuits.core.manager.UnregistrableError`Bases: `exceptions.Exception`

Raised if a component cannot be registered as child.

`circuits.core.manager.sleep` (*seconds*)

Delay execution of a coroutine for a given number of seconds. The argument may be a floating point number for subsecond precision.

circuits.core.pollers module

Poller Components for asynchronous file and socket I/O.

This module contains Poller components that enable polling of file or socket descriptors for read/write events. Pollers:

- Select - Poll - EPoll

class `circuits.core.pollers.BasePoller` (*channel=None*)Bases: `circuits.core.components.BaseComponent`**addReader** (*source, fd*)**addWriter** (*source, fd*)**channel** = `None`**discard** (*fd*)**getTarget** (*fd*)**isReading** (*fd*)**isWriting** (*fd*)**removeReader** (*fd*)**removeWriter** (*fd*)**resume** ()`circuits.core.pollers.Poller`alias of `circuits.core.pollers.Select`**class** `circuits.core.pollers.Select` (...) → new Select Poller ComponentBases: `circuits.core.pollers.BasePoller`

Creates a new Select Poller Component that uses the select poller implementation. This poller is not recommended but is available for legacy reasons as most systems implement select-based polling for backwards compatibility.

channel = `'select'`**class** `circuits.core.pollers.Poll` (...) → new Poll Poller ComponentBases: `circuits.core.pollers.BasePoller`

Creates a new Poll Poller Component that uses the poll poller implementation.

```
addReader (source, fd)  
addWriter (source, fd)  
channel = 'poll'  
discard (fd)  
removeReader (fd)  
removeWriter (fd)
```

class `circuits.core.pollers.EPoll (...)` → new EPoll Poller Component
Bases: `circuits.core.pollers.BasePoller`

Creates a new EPoll Poller Component that uses the epoll poller implementation.

```
addReader (source, fd)  
addWriter (source, fd)  
channel = 'epoll'  
discard (fd)  
removeReader (fd)  
removeWriter (fd)
```

class `circuits.core.pollers.KQueue (...)` → new KQueue Poller Component
Bases: `circuits.core.pollers.BasePoller`

Creates a new KQueue Poller Component that uses the kqueue poller implementation.

```
addReader (source, sock)  
addWriter (source, sock)  
channel = 'kqueue'  
discard (sock)  
removeReader (sock)  
removeWriter (sock)
```

circuits.core.timers module

Timer component to facilitate timed events.

class `circuits.core.timers.Timer (interval, event, *channels, **kwargs)`
Bases: `circuits.core.components.BaseComponent`

Timer Component

A timer is a component that fires an event once after a certain delay or periodically at a regular interval.

Parameters

- **interval** (datetime or number of seconds as a float) – the delay or interval to wait for until the event is fired. If interval is specified as datetime, the interval is recalculated as the time span from now to the given datetime.
- **event** (`Event`) – the event to fire.

- **persist** (*bool*) – An optional keyword argument which if `True` will cause the event to be fired repeatedly once per configured interval until the timer is unregistered. If `False`, the event fires exactly once after the specified interval, and the timer is unregistered. **Default:** `False`

expiry

reset (*interval=None*)

Reset the timer, i.e. clear the amount of time already waited for.

circuits.core.utils module

Utils

This module defines utilities used by circuits.

`circuits.core.utils.findchannel (root, channel, all=False)`

`circuits.core.utils.findcmp (root, component, all=False)`

`circuits.core.utils.findroot (component)`

`circuits.core.utils.findtype (root, component, all=False)`

`circuits.core.utils.flatten (root, visited=None)`

`circuits.core.utils.safeimport (name)`

circuits.core.values module

This defines the Value object used by components and events.

class `circuits.core.values.Value (event=None, manager=None)`

Bases: `object`

Create a new future Value Object

Creates a new future Value Object which is used by Event Objects and the Manager to store the result(s) of an Event Handler's execution of some Event in the system.

Parameters

- **event** (*Event instance*) – The Event this Value is associated with.
- **manager** (*A Manager/Component instance.*) – The Manager/Component used to trigger notifications.

Variables

- **result** – True if this value has been changed.
- **errors** – True if while setting this value an exception occurred.
- **notify** – True or an event name to notify of changes to this value

This is a Future/Promise implementation.

getValue (*recursive=True*)

inform (*force=False*)

setValue (*value*)

value

Value of this Value

circuits.core.workers module

Workers

Worker is a component used to perform “work” in independent threads or processes. Simply create an instance of `Worker()` with either *process=True* to create a pool of workers using sub-processes for CPU-bound work or *False* (the default) for a thread pool of workers for I/O bound work.

Then fire *task()* events with a function and **args* and ***kwargs* to pass to the function when called from within the workers.

```
class circuits.core.workers.Worker(*args, **kwargs)
```

Bases: `circuits.core.components.BaseComponent`

A thread/process Worker Component

This Component creates a pool of workers (either a thread or process) and executes the supplied function from a *task()* event passing supplied arguments and keyword-arguments to the function.

A *task_success* event is fired upon successful execution of the function and *task_failure* if it failed and threw an exception. The *task()* event can also be “waited” upon by using the *.call()* and *.wait()* primitives.

Parameters *process* (*bool*) – True to start this Worker as a process (Thread otherwise)

initializes x; see x.__class__.__doc__ for signature

channel = 'worker'

init (*process=False*, *workers=None*, *channel='worker'*)

```
class circuits.core.workers.task(f, *args, **kwargs)
```

Bases: `circuits.core.events.Event`

task Event

This Event is used to initiate a new task to be performed by a Worker

Parameters

- **f** (*function*) – The function to be executed.
- **args** (*tuple*) – Arguments to pass to the function
- **kwargs** (*dict*) – Keyword Arguments to pass to the function

x.__init__(...) initializes x; see x.__class__.__doc__ for signature

failure = True

success = True

Module contents

Core

This package contains the essential core parts of the circuits framework.

```
circuits.core.handler(*names, **kwargs)
```

Creates an Event Handler

This decorator can be applied to methods of classes derived from `circuits.core.components.BaseComponent`. It marks the method as a handler for the events passed as arguments to the `@handler` decorator. The events are specified by their name.

The decorated method's arguments must match the arguments passed to the `circuits.core.events.Event` on creation. Optionally, the method may have an additional first argument named `event`. If declared, the event object that caused the handler to be invoked is assigned to it.

By default, the handler is invoked by the component's root `Manager` for events that are propagated on the channel determined by the `BaseComponent`'s `channel` attribute. This may be overridden by specifying a different channel as a keyword parameter of the decorator (`channel=...`).

Keyword argument `priority` influences the order in which handlers for a specific event are invoked. The higher the priority, the earlier the handler is executed.

If you want to override a handler defined in a base class of your component, you must specify `override=True`, else your method becomes an additional handler for the event.

Return value

Normally, the results returned by the handlers for an event are simply collected in the `circuits.core.events.Event`'s `value` attribute. As a special case, a handler may return a `types.GeneratorType`. This signals to the dispatcher that the handler isn't ready to deliver a result yet. Rather, it has interrupted its execution with a `yield None` statement, thus preserving its current execution state.

The dispatcher saves the returned generator object as a task. All tasks are reexamined (i.e. their `next()` method is invoked) when the pending events have been executed.

This feature avoids an unnecessarily complicated chaining of event handlers. Imagine a handler A that needs the results from firing an event E in order to complete. Then without this feature, the final action of A would be to fire event E, and another handler for an event `SuccessE` would be required to complete handler A's operation, now having the result from invoking E available (actually it's even a bit more complicated).

Using this "suspend" feature, the handler simply fires event E and then yields `None` until e.g. it finds a result in E's `value` attribute. For the simplest scenario, there even is a utility method `circuits.core.manager.Manager.callEvent()` that combines firing and waiting.

```
class circuits.core.BaseComponent(*args, **kwargs)
```

Bases: `circuits.core.manager.Manager`

This is the base class for all components in a circuits based application. Components can (and should, except for root components) be registered with a parent component.

`BaseComponents` can declare methods as event handlers using the handler decoration (see `circuits.core.handlers.handler()`). The handlers are invoked for matching events from the component's channel (specified as the component's `channel` attribute).

`BaseComponents` inherit from `circuits.core.manager.Manager`. This provides components with the `circuits.core.manager.Manager.fireEvent()` method that can be used to fire events as the result of some computation.

Apart from the `fireEvent()` method, the `Manager` nature is important for root components that are started or run.

Variables `channel` – a component can be associated with a specific channel by setting this attribute. This should either be done by specifying a class attribute `channel` in the derived class or by passing a keyword parameter `channel="..."` to `__init__`. If specified, the component's handlers receive events on the specified channel only, and events fired by the component will be sent on the specified channel (this behavior may be overridden, see `Event`, `fireEvent()`)

and `handler()`). By default, the channel attribute is set to “*”, meaning that events are fired on all channels and received from all channels.

initializes `x`; see `x.__class__.__doc__` for signature

channel = '*'

classmethod events ()

Returns a list of all events this Component listens to

classmethod handlers ()

Returns a list of all event handlers for this Component

classmethod handles (*names)

Returns True if all names are event handlers of this Component

register (parent)

Inserts this component in the component tree as a child of the given *parent* node.

Parameters **parent** (*Manager*) – the parent component after registration has completed.

This method fires a `Registered` event to inform other components in the tree about the new member.

unregister ()

Removes this component from the component tree.

Removing a component from the component tree is a two stage process. First, the component is marked as to be removed, which prevents it from receiving further events, and a `prepare_unregister` event is fired. This allows other components to e.g. release references to the component to be removed before it is actually removed from the component tree.

After the processing of the `prepare_unregister` event has completed, the component is removed from the tree and an `unregistered` event is fired.

unregister_pending

class `circuits.core.Component` (*args, **kwargs)

Bases: `circuits.core.components.BaseComponent`

initializes `x`; see `x.__class__.__doc__` for signature

class `circuits.core.Event` (*args, **kwargs)

Bases: `object`

An event is a message send to one or more channels. It is eventually dispatched to all components that have handlers for one of the channels and the event type.

All normal arguments and keyword arguments passed to the constructor of an event are passed on to the handler. When declaring a handler, its argument list must therefore match the arguments used for creating the event.

Every event has a `name` attribute that is used for matching the event with the handlers.

Variables

- **channels** – an optional attribute that may be set before firing the event. If defined (usually as a class variable), the attribute specifies the channels that the event should be delivered to as a tuple. This overrides the default behavior of sending the event to the firing component’s channel.

When an event is fired, the value in this attribute is replaced for the instance with the channels that the event is actually sent to. This information may be used e.g. when the event is passed as a parameter to a handler.

- **value** – this is a `circuits.core.values.Value` object that holds the results returned by the handlers invoked for the event.

- **success** – if this optional attribute is set to `True`, an associated event `success` (original name with “_success” appended) will automatically be fired when all handlers for the event have been invoked successfully.
- **success_channels** – the success event is, by default, delivered to same channels as the successfully dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.
- **complete** – if this optional attribute is set to `True`, an associated event `complete` (original name with “_complete” appended) will automatically be fired when all handlers for the event and all events fired by these handlers (recursively) have been invoked successfully.
- **complete_channels** – the complete event is, by default, delivered to same channels as the initially dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

alert_done = False

cancel()

Cancel the event from being processed (if not already)

channels = ()

child(name, *args, **kwargs)

complete = False

classmethod create(_name, *args, **kwargs)

failure = False

notify = False

parent = None

stop()

Stop further processing of this event

success = False

waitingHandlers = 0

class circuits.core.task(f, *args, **kwargs)

Bases: `circuits.core.events.Event`

task Event

This Event is used to initiate a new task to be performed by a Worker

Parameters

- **f** (*function*) – The function to be executed.
- **args** (*tuple*) – Arguments to pass to the function
- **kwargs** (*dict*) – Keyword Arguments to pass to the function

`x.__init__(...)` initializes `x`; see `x.__class__.__doc__` for signature

failure = True

success = True

class circuits.core.Worker(*args, **kwargs)

Bases: `circuits.core.components.BaseComponent`

A thread/process Worker Component

This Component creates a pool of workers (either a thread or process) and executes the supplied function from a *task()* event passing supplied arguments and keyword-arguments to the function.

A *task_success* event is fired upon successful execution of the function and *task_failure* if it failed and threw an exception. The *task()* event can also be “waited” upon by using the *.call()* and *.wait()* primitives.

Parameters *process* (*bool*) – True to start this Worker as a process (Thread otherwise)

initializes x; see x.__class__.__doc__ for signature

channel = 'worker'

init (*process=False*, *workers=None*, *channel='worker'*)

class `circuits.core.ipc` (*event*, *channel=None*)

Bases: `circuits.core.events.Event`

ipc Event

Send an event to a child/parent process

Parameters

- **event** (`circuits.core.events.Event`) – Event to execute remotely.
- **channel** (*str*) – IPC Channel (channel to use on child/parent).

class `circuits.core.Bridge` (**args*, ***kwargs*)

Bases: `circuits.core.components.BaseComponent`

initializes x; see x.__class__.__doc__ for signature

channel = 'bridge'

init (*socket*, *channel='bridge'*)

class `circuits.core.Debugger` (*errors=True*, *events=True*, *file=None*, *logger=None*, *prefix=None*, *trim=None*, ***kwargs*)

Bases: `circuits.core.components.BaseComponent`

Create a new Debugger Component

Creates a new Debugger Component that listens to all events in the system printing each event to sys.stderr or a Logger Component.

Variables

- **IgnoreEvents** – list of events (*str*) to ignore
- **IgnoreChannels** – list of channels (*str*) to ignore
- **enabled** – Enabled/Disabled flag

Parameters *log* – Logger Component instance or None (*default*)

initializes x; see x.__class__.__doc__ for signature

IgnoreChannels = []

IgnoreEvents = ['generate_events']

class `circuits.core.Timer` (*interval*, *event*, **channels*, ***kwargs*)

Bases: `circuits.core.components.BaseComponent`

Timer Component

A timer is a component that fires an event once after a certain delay or periodically at a regular interval.

Parameters

- **interval** (datetime or number of seconds as a float) – the delay or interval to wait for until the event is fired. If interval is specified as datetime, the interval is recalculated as the time span from now to the given datetime.
- **event** (*Event*) – the event to fire.
- **persist** (bool) – An optional keyword argument which if `True` will cause the event to be fired repeatedly once per configured interval until the timer is unregistered. If `False`, the event fires exactly once after the specified interval, and the timer is unregistered. **Default:** `False`

expiry

reset (*interval=None*)

Reset the timer, i.e. clear the amount of time already waited for.

class `circuits.core.Manager` (*args, **kwargs)

Bases: `object`

The manager class has two roles. As a base class for component implementation, it provides methods for event and handler management. The method `fireEvent()` appends a new event at the end of the event queue for later execution. `waitEvent()` suspends the execution of a handler until all handlers for a given event have been invoked. `callEvent()` combines the last two methods in a single method.

The methods `addHandler()` and `removeHandler()` allow handlers for events to be added and removed dynamically. (The more common way to register a handler is to use the `handler()` decorator or derive the class from `Component`.)

In its second role, the `Manager` takes the role of the event executor. Every component hierarchy has a root component that maintains a queue of events. Firing an event effectively means appending it to the event queue maintained by the root manager. The `flush()` method removes all pending events from the queue and, for each event, invokes all the handlers. Usually, `flush()` is indirectly invoked by `run()`.

The manager optionally provides information about the execution of events as automatically generated events. If an `Event` has its `success` attribute set to `True`, the manager fires a `Success` event if all handlers have been executed without error. Note that this event will be enqueued (and dispatched) immediately after the events that have been fired by the event's handlers. So the success event indicates both the successful invocation of all handlers for the event and the processing of the immediate follow-up events fired by those handlers.

Sometimes it is not sufficient to know that an event and its immediate follow-up events have been processed. Rather, it is important to know when all state changes triggered by an event, directly or indirectly, have been performed. This also includes the processing of events that have been fired when invoking the handlers for the follow-up events and the processing of events that have again been fired by those handlers and so on. The completion of the processing of an event and all its direct or indirect follow-up events may be indicated by a `Complete` event. This event is generated by the manager if `Event` has its `complete` attribute set to `True`.

Apart from the event queue, the root manager also maintains a list of tasks, actually Python generators, that are updated when the event queue has been flushed.

initializes `x`; see `x.__class__.__doc__` for signature

addHandler (*f*)

call (*event, *channels, **kwargs*)

Fire the given event to the specified channels and suspend execution until it has been dispatched. This method may only be invoked as argument to a `yield` on the top execution level of a handler (e.g. “`yield self.callEvent(event)`”). It effectively creates and returns a generator that will be invoked by the main loop until the event has been dispatched (see `circuits.core.handlers.handler()`).

callEvent (*event, *channels, **kwargs*)

Fire the given event to the specified channels and suspend execution until it has been dispatched. This

method may only be invoked as argument to a `yield` on the top execution level of a handler (e.g. “`yield self.callEvent(event)`”). It effectively creates and returns a generator that will be invoked by the main loop until the event has been dispatched (see `circuits.core.handlers.handler()`).

fire (*event*, **channels*, ***kwargs*)

Fire an event into the system.

Parameters

- **event** – The event that is to be fired.
- **channels** – The channels that this event is delivered on. If no channels are specified, the event is delivered to the channels found in the event’s `channel` attribute. If this attribute is not set, the event is delivered to the firing component’s channel. And eventually, when set neither, the event is delivered on all channels (“*”).

fireEvent (*event*, **channels*, ***kwargs*)

Fire an event into the system.

Parameters

- **event** – The event that is to be fired.
- **channels** – The channels that this event is delivered on. If no channels are specified, the event is delivered to the channels found in the event’s `channel` attribute. If this attribute is not set, the event is delivered to the firing component’s channel. And eventually, when set neither, the event is delivered on all channels (“*”).

flush ()

Flush all Events in the Event Queue. If called on a manager that is not the root of an object hierarchy, the invocation is delegated to the root manager.

flushEvents ()

Flush all Events in the Event Queue. If called on a manager that is not the root of an object hierarchy, the invocation is delegated to the root manager.

getHandlers (*event*, *channel*, ***kwargs*)

join ()

name

Return the name of this Component/Manager

pid

Return the process id of this Component/Manager

processTask (*event*, *task*, *parent*=None)

registerChild (*component*)

registerTask (*g*)

removeHandler (*method*, *event*=None)

run (*socket*=None)

Run this manager. The method fires the `Started` event and then continuously calls `tick()`.

The method returns when the manager’s `stop()` method is invoked.

If invoked by a programs main thread, a signal handler for the `INT` and `TERM` signals is installed. This handler fires the corresponding `Signal` events and then calls `stop()` for the manager.

running

Return the running state of this Component/Manager

start (*process=False, link=None*)

Start a new thread or process that invokes this manager's `run()` method. The invocation of this method returns immediately after the task or process has been started.

stop (*code=None*)

Stop this manager. Invoking this method causes an invocation of `run()` to return.

tick (*timeout=-1*)

Execute all possible actions once. Process all registered tasks and flush the event queue. If the application is running fire a `GenerateEvents` to get new events from sources.

This method is usually invoked from `run()`. It may also be used to build an application specific main loop.

Parameters *timeout* (*float, measuring seconds*) – the maximum waiting time spent in this method. If negative, the method may block until at least one action has been taken.

unregisterChild (*component*)

unregisterTask (*g*)

wait (*event, *channels, **kwargs*)

waitEvent (*event, *channels, **kwargs*)

exception `circuits.core.TimeoutError`

Bases: `exceptions.Exception`

Raised if wait event timeout occurred

circuits.io package

Submodules

circuits.io.events module

I/O Events

This module implements commonly used I/O events used by other I/O modules.

class `circuits.io.events.accessed(*args, **kwargs)`

Bases: `circuits.core.events.Event`

accessed Event

An event is a message send to one or more channels. It is eventually dispatched to all components that have handlers for one of the channels and the event type.

All normal arguments and keyword arguments passed to the constructor of an event are passed on to the handler. When declaring a handler, its argument list must therefore match the arguments used for creating the event.

Every event has a `name` attribute that is used for matching the event with the handlers.

Variables

- **`channels`** – an optional attribute that may be set before firing the event. If defined (usually as a class variable), the attribute specifies the channels that the event should be delivered to as a tuple. This overrides the default behavior of sending the event to the firing component's channel.

When an event is fired, the value in this attribute is replaced for the instance with the channels that the event is actually sent to. This information may be used e.g. when the event is passed as a parameter to a handler.

- **value** – this is a `circuits.core.values.Value` object that holds the results returned by the handlers invoked for the event.
- **success** – if this optional attribute is set to `True`, an associated event `success` (original name with “_success” appended) will automatically be fired when all handlers for the event have been invoked successfully.
- **success_channels** – the success event is, by default, delivered to same channels as the successfully dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.
- **complete** – if this optional attribute is set to `True`, an associated event `complete` (original name with “_complete” appended) will automatically be fired when all handlers for the event and all events fired by these handlers (recursively) have been invoked successfully.
- **complete_channels** – the complete event is, by default, delivered to same channels as the initially dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

```
class circuits.io.events.close(*args, **kwargs)
```

Bases: `circuits.core.events.Event`

close Event

An event is a message send to one or more channels. It is eventually dispatched to all components that have handlers for one of the channels and the event type.

All normal arguments and keyword arguments passed to the constructor of an event are passed on to the handler. When declaring a handler, its argument list must therefore match the arguments used for creating the event.

Every event has a `name` attribute that is used for matching the event with the handlers.

Variables

- **channels** – an optional attribute that may be set before firing the event. If defined (usually as a class variable), the attribute specifies the channels that the event should be delivered to as a tuple. This overrides the default behavior of sending the event to the firing component’s channel.

When an event is fired, the value in this attribute is replaced for the instance with the channels that the event is actually sent to. This information may be used e.g. when the event is passed as a parameter to a handler.

- **value** – this is a `circuits.core.values.Value` object that holds the results returned by the handlers invoked for the event.
- **success** – if this optional attribute is set to `True`, an associated event `success` (original name with “_success” appended) will automatically be fired when all handlers for the event have been invoked successfully.
- **success_channels** – the success event is, by default, delivered to same channels as the successfully dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.
- **complete** – if this optional attribute is set to `True`, an associated event `complete` (original name with “_complete” appended) will automatically be fired when all handlers for the event and all events fired by these handlers (recursively) have been invoked successfully.

- **complete_channels** – the complete event is, by default, delivered to same channels as the initially dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

class `circuits.io.events.closed(*args, **kwargs)`

Bases: `circuits.core.events.Event`

closed Event

An event is a message send to one or more channels. It is eventually dispatched to all components that have handlers for one of the channels and the event type.

All normal arguments and keyword arguments passed to the constructor of an event are passed on to the handler. When declaring a handler, its argument list must therefore match the arguments used for creating the event.

Every event has a `name` attribute that is used for matching the event with the handlers.

Variables

- **channels** – an optional attribute that may be set before firing the event. If defined (usually as a class variable), the attribute specifies the channels that the event should be delivered to as a tuple. This overrides the default behavior of sending the event to the firing component's channel.

When an event is fired, the value in this attribute is replaced for the instance with the channels that the event is actually sent to. This information may be used e.g. when the event is passed as a parameter to a handler.

- **value** – this is a `circuits.core.values.Value` object that holds the results returned by the handlers invoked for the event.
- **success** – if this optional attribute is set to `True`, an associated event `success` (original name with “_success” appended) will automatically be fired when all handlers for the event have been invoked successfully.
- **success_channels** – the success event is, by default, delivered to same channels as the successfully dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.
- **complete** – if this optional attribute is set to `True`, an associated event `complete` (original name with “_complete” appended) will automatically be fired when all handlers for the event and all events fired by these handlers (recursively) have been invoked successfully.
- **complete_channels** – the complete event is, by default, delivered to same channels as the initially dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

class `circuits.io.events.created(*args, **kwargs)`

Bases: `circuits.core.events.Event`

created Event

An event is a message send to one or more channels. It is eventually dispatched to all components that have handlers for one of the channels and the event type.

All normal arguments and keyword arguments passed to the constructor of an event are passed on to the handler. When declaring a handler, its argument list must therefore match the arguments used for creating the event.

Every event has a `name` attribute that is used for matching the event with the handlers.

Variables

- **channels** – an optional attribute that may be set before firing the event. If defined (usually as a class variable), the attribute specifies the channels that the event should be delivered to

as a tuple. This overrides the default behavior of sending the event to the firing component's channel.

When an event is fired, the value in this attribute is replaced for the instance with the channels that the event is actually sent to. This information may be used e.g. when the event is passed as a parameter to a handler.

- **value** – this is a `circuits.core.values.Value` object that holds the results returned by the handlers invoked for the event.
- **success** – if this optional attribute is set to `True`, an associated event `success` (original name with “_success” appended) will automatically be fired when all handlers for the event have been invoked successfully.
- **success_channels** – the success event is, by default, delivered to same channels as the successfully dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.
- **complete** – if this optional attribute is set to `True`, an associated event `complete` (original name with “_complete” appended) will automatically be fired when all handlers for the event and all events fired by these handlers (recursively) have been invoked successfully.
- **complete_channels** – the complete event is, by default, delivered to same channels as the initially dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

```
class circuits.io.events.deleted(*args, **kwargs)
```

Bases: `circuits.core.events.Event`

deleted Event

An event is a message send to one or more channels. It is eventually dispatched to all components that have handlers for one of the channels and the event type.

All normal arguments and keyword arguments passed to the constructor of an event are passed on to the handler. When declaring a handler, its argument list must therefore match the arguments used for creating the event.

Every event has a `name` attribute that is used for matching the event with the handlers.

Variables

- **channels** – an optional attribute that may be set before firing the event. If defined (usually as a class variable), the attribute specifies the channels that the event should be delivered to as a tuple. This overrides the default behavior of sending the event to the firing component's channel.

When an event is fired, the value in this attribute is replaced for the instance with the channels that the event is actually sent to. This information may be used e.g. when the event is passed as a parameter to a handler.

- **value** – this is a `circuits.core.values.Value` object that holds the results returned by the handlers invoked for the event.
- **success** – if this optional attribute is set to `True`, an associated event `success` (original name with “_success” appended) will automatically be fired when all handlers for the event have been invoked successfully.
- **success_channels** – the success event is, by default, delivered to same channels as the successfully dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

- **complete** – if this optional attribute is set to `True`, an associated event `complete` (original name with “_complete” appended) will automatically be fired when all handlers for the event and all events fired by these handlers (recursively) have been invoked successfully.
- **complete_channels** – the complete event is, by default, delivered to same channels as the initially dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

```
class circuits.io.events.eof(*args, **kwargs)
```

Bases: `circuits.core.events.Event`

eof Event

An event is a message send to one or more channels. It is eventually dispatched to all components that have handlers for one of the channels and the event type.

All normal arguments and keyword arguments passed to the constructor of an event are passed on to the handler. When declaring a handler, its argument list must therefore match the arguments used for creating the event.

Every event has a `name` attribute that is used for matching the event with the handlers.

Variables

- **channels** – an optional attribute that may be set before firing the event. If defined (usually as a class variable), the attribute specifies the channels that the event should be delivered to as a tuple. This overrides the default behavior of sending the event to the firing component’s channel.

When an event is fired, the value in this attribute is replaced for the instance with the channels that the event is actually sent to. This information may be used e.g. when the event is passed as a parameter to a handler.

- **value** – this is a `circuits.core.values.Value` object that holds the results returned by the handlers invoked for the event.
- **success** – if this optional attribute is set to `True`, an associated event `success` (original name with “_success” appended) will automatically be fired when all handlers for the event have been invoked successfully.
- **success_channels** – the success event is, by default, delivered to same channels as the successfully dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.
- **complete** – if this optional attribute is set to `True`, an associated event `complete` (original name with “_complete” appended) will automatically be fired when all handlers for the event and all events fired by these handlers (recursively) have been invoked successfully.
- **complete_channels** – the complete event is, by default, delivered to same channels as the initially dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

```
class circuits.io.events.error(*args, **kwargs)
```

Bases: `circuits.core.events.Event`

error Event

An event is a message send to one or more channels. It is eventually dispatched to all components that have handlers for one of the channels and the event type.

All normal arguments and keyword arguments passed to the constructor of an event are passed on to the handler. When declaring a handler, its argument list must therefore match the arguments used for creating the event.

Every event has a `name` attribute that is used for matching the event with the handlers.

Variables

- **channels** – an optional attribute that may be set before firing the event. If defined (usually as a class variable), the attribute specifies the channels that the event should be delivered to as a tuple. This overrides the default behavior of sending the event to the firing component’s channel.

When an event is fired, the value in this attribute is replaced for the instance with the channels that the event is actually sent to. This information may be used e.g. when the event is passed as a parameter to a handler.

- **value** – this is a `circuits.core.values.Value` object that holds the results returned by the handlers invoked for the event.
- **success** – if this optional attribute is set to `True`, an associated event `success` (original name with “_success” appended) will automatically be fired when all handlers for the event have been invoked successfully.
- **success_channels** – the success event is, by default, delivered to same channels as the successfully dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.
- **complete** – if this optional attribute is set to `True`, an associated event `complete` (original name with “_complete” appended) will automatically be fired when all handlers for the event and all events fired by these handlers (recursively) have been invoked successfully.
- **complete_channels** – the complete event is, by default, delivered to same channels as the initially dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

class `circuits.io.events.modified(*args, **kwargs)`
Bases: `circuits.core.events.Event`

modified Event

An event is a message send to one or more channels. It is eventually dispatched to all components that have handlers for one of the channels and the event type.

All normal arguments and keyword arguments passed to the constructor of an event are passed on to the handler. When declaring a handler, its argument list must therefore match the arguments used for creating the event.

Every event has a `name` attribute that is used for matching the event with the handlers.

Variables

- **channels** – an optional attribute that may be set before firing the event. If defined (usually as a class variable), the attribute specifies the channels that the event should be delivered to as a tuple. This overrides the default behavior of sending the event to the firing component’s channel.

When an event is fired, the value in this attribute is replaced for the instance with the channels that the event is actually sent to. This information may be used e.g. when the event is passed as a parameter to a handler.

- **value** – this is a `circuits.core.values.Value` object that holds the results returned by the handlers invoked for the event.
- **success** – if this optional attribute is set to `True`, an associated event `success` (original name with “_success” appended) will automatically be fired when all handlers for the event have been invoked successfully.

- **success_channels** – the success event is, by default, delivered to same channels as the successfully dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.
- **complete** – if this optional attribute is set to `True`, an associated event `complete` (original name with “_complete” appended) will automatically be fired when all handlers for the event and all events fired by these handlers (recursively) have been invoked successfully.
- **complete_channels** – the complete event is, by default, delivered to same channels as the initially dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

```
class circuits.io.events.moved(*args, **kwargs)
```

Bases: `circuits.core.events.Event`

moved Event

An event is a message send to one or more channels. It is eventually dispatched to all components that have handlers for one of the channels and the event type.

All normal arguments and keyword arguments passed to the constructor of an event are passed on to the handler. When declaring a handler, its argument list must therefore match the arguments used for creating the event.

Every event has a `name` attribute that is used for matching the event with the handlers.

Variables

- **channels** – an optional attribute that may be set before firing the event. If defined (usually as a class variable), the attribute specifies the channels that the event should be delivered to as a tuple. This overrides the default behavior of sending the event to the firing component’s channel.

When an event is fired, the value in this attribute is replaced for the instance with the channels that the event is actually sent to. This information may be used e.g. when the event is passed as a parameter to a handler.

- **value** – this is a `circuits.core.values.Value` object that holds the results returned by the handlers invoked for the event.
- **success** – if this optional attribute is set to `True`, an associated event `success` (original name with “_success” appended) will automatically be fired when all handlers for the event have been invoked successfully.
- **success_channels** – the success event is, by default, delivered to same channels as the successfully dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.
- **complete** – if this optional attribute is set to `True`, an associated event `complete` (original name with “_complete” appended) will automatically be fired when all handlers for the event and all events fired by these handlers (recursively) have been invoked successfully.
- **complete_channels** – the complete event is, by default, delivered to same channels as the initially dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

```
class circuits.io.events.open(*args, **kwargs)
```

Bases: `circuits.core.events.Event`

open Event

An event is a message send to one or more channels. It is eventually dispatched to all components that have handlers for one of the channels and the event type.

All normal arguments and keyword arguments passed to the constructor of an event are passed on to the handler. When declaring a handler, its argument list must therefore match the arguments used for creating the event.

Every event has a `name` attribute that is used for matching the event with the handlers.

Variables

- **`channels`** – an optional attribute that may be set before firing the event. If defined (usually as a class variable), the attribute specifies the channels that the event should be delivered to as a tuple. This overrides the default behavior of sending the event to the firing component’s channel.

When an event is fired, the value in this attribute is replaced for the instance with the channels that the event is actually sent to. This information may be used e.g. when the event is passed as a parameter to a handler.

- **`value`** – this is a `circuits.core.values.Value` object that holds the results returned by the handlers invoked for the event.
- **`success`** – if this optional attribute is set to `True`, an associated event `success` (original name with “_success” appended) will automatically be fired when all handlers for the event have been invoked successfully.
- **`success_channels`** – the success event is, by default, delivered to same channels as the successfully dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.
- **`complete`** – if this optional attribute is set to `True`, an associated event `complete` (original name with “_complete” appended) will automatically be fired when all handlers for the event and all events fired by these handlers (recursively) have been invoked successfully.
- **`complete_channels`** – the complete event is, by default, delivered to same channels as the initially dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

```
class circuits.io.events.opened(*args, **kwargs)
```

Bases: `circuits.core.events.Event`

opened Event

An event is a message send to one or more channels. It is eventually dispatched to all components that have handlers for one of the channels and the event type.

All normal arguments and keyword arguments passed to the constructor of an event are passed on to the handler. When declaring a handler, its argument list must therefore match the arguments used for creating the event.

Every event has a `name` attribute that is used for matching the event with the handlers.

Variables

- **`channels`** – an optional attribute that may be set before firing the event. If defined (usually as a class variable), the attribute specifies the channels that the event should be delivered to as a tuple. This overrides the default behavior of sending the event to the firing component’s channel.

When an event is fired, the value in this attribute is replaced for the instance with the channels that the event is actually sent to. This information may be used e.g. when the event is passed as a parameter to a handler.

- **`value`** – this is a `circuits.core.values.Value` object that holds the results returned by the handlers invoked for the event.

- **success** – if this optional attribute is set to `True`, an associated event `success` (original name with “_success” appended) will automatically be fired when all handlers for the event have been invoked successfully.
- **success_channels** – the success event is, by default, delivered to same channels as the successfully dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.
- **complete** – if this optional attribute is set to `True`, an associated event `complete` (original name with “_complete” appended) will automatically be fired when all handlers for the event and all events fired by these handlers (recursively) have been invoked successfully.
- **complete_channels** – the complete event is, by default, delivered to same channels as the initially dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

```
class circuits.io.events.read(*args, **kwargs)
```

Bases: `circuits.core.events.Event`

read Event

An event is a message send to one or more channels. It is eventually dispatched to all components that have handlers for one of the channels and the event type.

All normal arguments and keyword arguments passed to the constructor of an event are passed on to the handler. When declaring a handler, its argument list must therefore match the arguments used for creating the event.

Every event has a `name` attribute that is used for matching the event with the handlers.

Variables

- **channels** – an optional attribute that may be set before firing the event. If defined (usually as a class variable), the attribute specifies the channels that the event should be delivered to as a tuple. This overrides the default behavior of sending the event to the firing component’s channel.

When an event is fired, the value in this attribute is replaced for the instance with the channels that the event is actually sent to. This information may be used e.g. when the event is passed as a parameter to a handler.

- **value** – this is a `circuits.core.values.Value` object that holds the results returned by the handlers invoked for the event.
- **success** – if this optional attribute is set to `True`, an associated event `success` (original name with “_success” appended) will automatically be fired when all handlers for the event have been invoked successfully.
- **success_channels** – the success event is, by default, delivered to same channels as the successfully dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.
- **complete** – if this optional attribute is set to `True`, an associated event `complete` (original name with “_complete” appended) will automatically be fired when all handlers for the event and all events fired by these handlers (recursively) have been invoked successfully.
- **complete_channels** – the complete event is, by default, delivered to same channels as the initially dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

```
class circuits.io.events.ready(*args, **kwargs)
```

Bases: `circuits.core.events.Event`

ready Event

An event is a message send to one or more channels. It is eventually dispatched to all components that have handlers for one of the channels and the event type.

All normal arguments and keyword arguments passed to the constructor of an event are passed on to the handler. When declaring a handler, its argument list must therefore match the arguments used for creating the event.

Every event has a `name` attribute that is used for matching the event with the handlers.

Variables

- **`channels`** – an optional attribute that may be set before firing the event. If defined (usually as a class variable), the attribute specifies the channels that the event should be delivered to as a tuple. This overrides the default behavior of sending the event to the firing component’s channel.

When an event is fired, the value in this attribute is replaced for the instance with the channels that the event is actually sent to. This information may be used e.g. when the event is passed as a parameter to a handler.

- **`value`** – this is a `circuits.core.values.Value` object that holds the results returned by the handlers invoked for the event.
- **`success`** – if this optional attribute is set to `True`, an associated event `success` (original name with “_success” appended) will automatically be fired when all handlers for the event have been invoked successfully.
- **`success_channels`** – the success event is, by default, delivered to same channels as the successfully dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.
- **`complete`** – if this optional attribute is set to `True`, an associated event `complete` (original name with “_complete” appended) will automatically be fired when all handlers for the event and all events fired by these handlers (recursively) have been invoked successfully.
- **`complete_channels`** – the complete event is, by default, delivered to same channels as the initially dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

```
class circuits.io.events.seek(*args, **kwargs)
```

Bases: `circuits.core.events.Event`

seek Event

An event is a message send to one or more channels. It is eventually dispatched to all components that have handlers for one of the channels and the event type.

All normal arguments and keyword arguments passed to the constructor of an event are passed on to the handler. When declaring a handler, its argument list must therefore match the arguments used for creating the event.

Every event has a `name` attribute that is used for matching the event with the handlers.

Variables

- **`channels`** – an optional attribute that may be set before firing the event. If defined (usually as a class variable), the attribute specifies the channels that the event should be delivered to as a tuple. This overrides the default behavior of sending the event to the firing component’s channel.

When an event is fired, the value in this attribute is replaced for the instance with the channels that the event is actually sent to. This information may be used e.g. when the event is passed as a parameter to a handler.

- **value** – this is a `circuits.core.values.Value` object that holds the results returned by the handlers invoked for the event.
- **success** – if this optional attribute is set to `True`, an associated event `success` (original name with “_success” appended) will automatically be fired when all handlers for the event have been invoked successfully.
- **success_channels** – the success event is, by default, delivered to same channels as the successfully dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.
- **complete** – if this optional attribute is set to `True`, an associated event `complete` (original name with “_complete” appended) will automatically be fired when all handlers for the event and all events fired by these handlers (recursively) have been invoked successfully.
- **complete_channels** – the complete event is, by default, delivered to same channels as the initially dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

```
class circuits.io.events.started(*args, **kwargs)
```

Bases: `circuits.core.events.Event`

started Event

An event is a message send to one or more channels. It is eventually dispatched to all components that have handlers for one of the channels and the event type.

All normal arguments and keyword arguments passed to the constructor of an event are passed on to the handler. When declaring a handler, its argument list must therefore match the arguments used for creating the event.

Every event has a `name` attribute that is used for matching the event with the handlers.

Variables

- **channels** – an optional attribute that may be set before firing the event. If defined (usually as a class variable), the attribute specifies the channels that the event should be delivered to as a tuple. This overrides the default behavior of sending the event to the firing component’s channel.
- When an event is fired, the value in this attribute is replaced for the instance with the channels that the event is actually sent to. This information may be used e.g. when the event is passed as a parameter to a handler.
- **value** – this is a `circuits.core.values.Value` object that holds the results returned by the handlers invoked for the event.
 - **success** – if this optional attribute is set to `True`, an associated event `success` (original name with “_success” appended) will automatically be fired when all handlers for the event have been invoked successfully.
 - **success_channels** – the success event is, by default, delivered to same channels as the successfully dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.
 - **complete** – if this optional attribute is set to `True`, an associated event `complete` (original name with “_complete” appended) will automatically be fired when all handlers for the event and all events fired by these handlers (recursively) have been invoked successfully.
 - **complete_channels** – the complete event is, by default, delivered to same channels as the initially dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

```
class circuits.io.events.stopped(*args, **kwargs)
```

Bases: `circuits.core.events.Event`

stopped Event

An event is a message send to one or more channels. It is eventually dispatched to all components that have handlers for one of the channels and the event type.

All normal arguments and keyword arguments passed to the constructor of an event are passed on to the handler. When declaring a handler, its argument list must therefore match the arguments used for creating the event.

Every event has a `name` attribute that is used for matching the event with the handlers.

Variables

- **channels** – an optional attribute that may be set before firing the event. If defined (usually as a class variable), the attribute specifies the channels that the event should be delivered to as a tuple. This overrides the default behavior of sending the event to the firing component’s channel.

When an event is fired, the value in this attribute is replaced for the instance with the channels that the event is actually sent to. This information may be used e.g. when the event is passed as a parameter to a handler.

- **value** – this is a `circuits.core.values.Value` object that holds the results returned by the handlers invoked for the event.
- **success** – if this optional attribute is set to `True`, an associated event `success` (original name with “_success” appended) will automatically be fired when all handlers for the event have been invoked successfully.
- **success_channels** – the success event is, by default, delivered to same channels as the successfully dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.
- **complete** – if this optional attribute is set to `True`, an associated event `complete` (original name with “_complete” appended) will automatically be fired when all handlers for the event and all events fired by these handlers (recursively) have been invoked successfully.
- **complete_channels** – the complete event is, by default, delivered to same channels as the initially dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

```
class circuits.io.events.unmounted(*args, **kwargs)
```

Bases: `circuits.core.events.Event`

unmounted Event

An event is a message send to one or more channels. It is eventually dispatched to all components that have handlers for one of the channels and the event type.

All normal arguments and keyword arguments passed to the constructor of an event are passed on to the handler. When declaring a handler, its argument list must therefore match the arguments used for creating the event.

Every event has a `name` attribute that is used for matching the event with the handlers.

Variables

- **channels** – an optional attribute that may be set before firing the event. If defined (usually as a class variable), the attribute specifies the channels that the event should be delivered to as a tuple. This overrides the default behavior of sending the event to the firing component’s channel.

When an event is fired, the value in this attribute is replaced for the instance with the channels that the event is actually sent to. This information may be used e.g. when the event is passed as a parameter to a handler.

- **value** – this is a `circuits.core.values.Value` object that holds the results returned by the handlers invoked for the event.
- **success** – if this optional attribute is set to `True`, an associated event `success` (original name with “_success” appended) will automatically be fired when all handlers for the event have been invoked successfully.
- **success_channels** – the success event is, by default, delivered to same channels as the successfully dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.
- **complete** – if this optional attribute is set to `True`, an associated event `complete` (original name with “_complete” appended) will automatically be fired when all handlers for the event and all events fired by these handlers (recursively) have been invoked successfully.
- **complete_channels** – the complete event is, by default, delivered to same channels as the initially dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

```
class circuits.io.events.write(*args, **kwargs)
```

Bases: `circuits.core.events.Event`

write Event

An event is a message send to one or more channels. It is eventually dispatched to all components that have handlers for one of the channels and the event type.

All normal arguments and keyword arguments passed to the constructor of an event are passed on to the handler. When declaring a handler, its argument list must therefore match the arguments used for creating the event.

Every event has a `name` attribute that is used for matching the event with the handlers.

Variables

- **channels** – an optional attribute that may be set before firing the event. If defined (usually as a class variable), the attribute specifies the channels that the event should be delivered to as a tuple. This overrides the default behavior of sending the event to the firing component’s channel.

When an event is fired, the value in this attribute is replaced for the instance with the channels that the event is actually sent to. This information may be used e.g. when the event is passed as a parameter to a handler.

- **value** – this is a `circuits.core.values.Value` object that holds the results returned by the handlers invoked for the event.
- **success** – if this optional attribute is set to `True`, an associated event `success` (original name with “_success” appended) will automatically be fired when all handlers for the event have been invoked successfully.
- **success_channels** – the success event is, by default, delivered to same channels as the successfully dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.
- **complete** – if this optional attribute is set to `True`, an associated event `complete` (original name with “_complete” appended) will automatically be fired when all handlers for the event and all events fired by these handlers (recursively) have been invoked successfully.

- **complete_channels** – the complete event is, by default, delivered to same channels as the initially dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

circuits.io.file module

File I/O

This module implements a wrapper for basic File I/O.

```
class circuits.io.file.File(*args, **kwargs)
    Bases: circuits.core.components.Component
    initializes x; see x.__class__.__doc__ for signature
    channel = 'file'
    close()
    closed
    filename
    init(filename, mode='r', bufsize=4096, encoding=None, channel='file')
    mode
    seek(offset, whence=0)
    write(data)
```

circuits.io.notify module

circuits.io.process module

Process

This module implements a wrapper for basic subprocess.Popen functionality.

```
class circuits.io.process.Process(*args, **kwargs)
    Bases: circuits.core.components.BaseComponent
    initializes x; see x.__class__.__doc__ for signature
    channel = 'process'
    init(args, cwd=None, shell=False)
    kill()
    signal(signal)
    start()
        Start a new thread or process that invokes this manager's run() method. The invocation of this method
        returns immediately after the task or process has been started.
    status
    stop()
        Stop this manager. Invoking this method causes an invocation of run() to return.
    wait()
```



```
write (data)
```

```
class circuits.io.process.terminated (*args)
```

```
    Bases: circuits.core.events.Event
```

```
    terminated Event
```

```
    This Event is sent when a process is completed
```

```
    Parameters args – (process)
```

circuits.io.serial module

Serial I/O

This module implements basic Serial (RS232) I/O.

```
class circuits.io.serial.Serial (port,    baudrate=115200,    bufsize=4096,    timeout=0.2,
                                encoding='UTF-8', readline=False, channel='serial')
```

```
    Bases: circuits.core.components.Component
```

```
    channel = 'serial'
```

```
    close ()
```

```
    write (data)
```

Module contents

I/O Support

This package contains various I/O Components. Provided are a generic File Component, StdIn, StdOut and StdErr components. Instances of StdIn, StdOut and StdErr are also created by importing this package.

circuits.net package

Submodules

circuits.net.events module

Networking Events

This module implements commonly used Networking events used by socket components.

```
class circuits.net.events.broadcast (*args)
```

```
    Bases: circuits.core.events.Event
```

```
    broadcast Event
```

```
    This Event is used by the UDPServer/UDPClient sockets to send a message on the <broadcast> network.
```

Note:

- This event is never sent, it is used to send data.
 - This event is used for both Client and Server UDP Components.
-

Parameters `args` – (data, port)

`x.__init__(...)` initializes `x`; see `x.__class__.__doc__` for signature

class `circuits.net.events.close(*args)`

Bases: `circuits.core.events.Event`

close Event

This Event is used to notify a client, client connection or server that we want to close.

Note:

- This event is never sent, it is used to close.
 - This event is used for both Client and Server Components.
-

Parameters `args` – Client: () Server: (sock)

`x.__init__(...)` initializes `x`; see `x.__class__.__doc__` for signature

class `circuits.net.events.closed(*args, **kwargs)`

Bases: `circuits.core.events.Event`

closed Event

This Event is sent when a server has closed its listening socket.

Note: This event is for Server components.

An event is a message send to one or more channels. It is eventually dispatched to all components that have handlers for one of the channels and the event type.

All normal arguments and keyword arguments passed to the constructor of an event are passed on to the handler. When declaring a handler, its argument list must therefore match the arguments used for creating the event.

Every event has a `name` attribute that is used for matching the event with the handlers.

Variables

- **`channels`** – an optional attribute that may be set before firing the event. If defined (usually as a class variable), the attribute specifies the channels that the event should be delivered to as a tuple. This overrides the default behavior of sending the event to the firing component’s channel.

When an event is fired, the value in this attribute is replaced for the instance with the channels that the event is actually sent to. This information may be used e.g. when the event is passed as a parameter to a handler.

- **`value`** – this is a `circuits.core.values.Value` object that holds the results returned by the handlers invoked for the event.
- **`success`** – if this optional attribute is set to `True`, an associated event `success` (original name with “_success” appended) will automatically be fired when all handlers for the event have been invoked successfully.
- **`success_channels`** – the success event is, by default, delivered to same channels as the successfully dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

- **complete** – if this optional attribute is set to `True`, an associated event `complete` (original name with “_complete” appended) will automatically be fired when all handlers for the event and all events fired by these handlers (recursively) have been invoked successfully.
- **complete_channels** – the complete event is, by default, delivered to same channels as the initially dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

class `circuits.net.events.connect (*args, **kwargs)`

Bases: `circuits.core.events.Event`

connect Event

This Event is sent when a new client connection has arrived on a server. This event is also used for client’s to initiate a new connection to a remote host.

Note: This event is used for both Client and Server Components.

Parameters

- **args** (*tuple*) – Client: (host, port) Server: (sock, host, port)
- **kwargs** (*dict*) – Client: (ssl)

`x.__init__(...)` initializes `x`; see `x.__class__.__doc__` for signature

class `circuits.net.events.connected (host, port)`

Bases: `circuits.core.events.Event`

connected Event

This Event is sent when a client has successfully connected.

Note: This event is for Client Components.

Parameters

- **host** – The hostname connected to.
- **port** – The port connected to

`x.__init__(...)` initializes `x`; see `x.__class__.__doc__` for signature

class `circuits.net.events.disconnect (*args, **kwargs)`

Bases: `circuits.core.events.Event`

disconnect Event

This Event is sent when a client connection has closed on a server. This event is also used for client’s to disconnect from a remote host.

Note: This event is used for both Client and Server Components.

Parameters **args** – Client: () Server: (sock)

`x.__init__(...)` initializes `x`; see `x.__class__.__doc__` for signature

class `circuits.net.events.disconnected`

Bases: `circuits.core.events.Event`

disconnected Event

This Event is sent when a client has disconnected

Note: This event is for Client Components.

`x.__init__(...)` initializes `x`; see `x.__class__.__doc__` for signature

class `circuits.net.events.error` (**args*)

Bases: `circuits.core.events.Event`

error Event

This Event is sent when a client or server connection has an error.

Note: This event is used for both Client and Server Components.

Parameters *args* – Client: (error) Server: (sock, error)

`x.__init__(...)` initializes `x`; see `x.__class__.__doc__` for signature

class `circuits.net.events.read` (**args*)

Bases: `circuits.core.events.Event`

read Event

This Event is sent when a client or server connection has read any data.

Note: This event is used for both Client and Server Components.

Parameters *args* – Client: (data) Server: (sock, data)

`x.__init__(...)` initializes `x`; see `x.__class__.__doc__` for signature

class `circuits.net.events.ready` (*component*, *bind=None*)

Bases: `circuits.core.events.Event`

ready Event

This Event is used to notify the rest of the system that the underlying Client or Server Component is ready to begin processing connections or incoming/outgoing data. (This is triggered as a direct result of having the capability to support multiple client/server components with a single poller component instance in a system).

Note: This event is used for both Client and Server Components.

Parameters

- **component** – The Client/Server Component that is ready.
- **bind** – The (host, port) the server has bound to.

`x.__init__(...)` initializes `x`; see `x.__class__.__doc__` for signature

```
class circuits.net.events.starttls(sock)
```

```
Bases: circuits.core.events.Event
```

```
starttls Event
```

```
This event can be fired to upgrade the socket connection to a TLS secured connection.
```

Note: This event is currently only available for Server Components.

Parameters **sock** (*socket.socket*) – The client socket where to start TLS.

```
class circuits.net.events.unreachable(host, port, reason=None)
```

```
Bases: circuits.core.events.Event
```

```
unreachable Event
```

```
This Event is sent when a server is unreachable for a client
```

Parameters

- **host** – Server hostname or IP
- **port** – Server port

```
x.__init__(...) initializes x; see x.__class__.__doc__ for signature
```

```
class circuits.net.events.write(*args)
```

```
Bases: circuits.core.events.Event
```

```
write Event
```

```
This Event is used to notify a client, client connection or server that we have data to be written.
```

Note:

- This event is never sent, it is used to send data.
 - This event is used for both Client and Server Components.
-

Parameters **args** – Client: (data) Server: (sock, data)

```
x.__init__(...) initializes x; see x.__class__.__doc__ for signature
```

circuits.net.sockets module

Socket Components

This module contains various Socket Components for use with Networking.

```
class circuits.net.sockets.Client(bind=None, bufsize=4096, channel='client', **kwargs)
```

```
Bases: circuits.core.components.BaseComponent
```

```
channel = 'client'
```

```
close()
```

```
connected
```

```
parse_bind_parameter(bind_parameter)
```

```
    socket_family = 2
    socket_options = []
    socket_protocol = 0
    socket_type = 1
    write(data)

circuits.net.sockets.Pipe(*channels, **kwargs)
    Create a new full duplex Pipe

    Returns a pair of UNIXClient instances connected on either side of the pipe.

class circuits.net.sockets.Server(bind, secure=False, backlog=5000, bufsize=4096, chan-
                                nel='server', **kwargs)
    Bases: circuits.core.components.BaseComponent
    channel = 'server'
    close(sock=None)
    connected
    host
    parse_bind_parameter(bind_parameter)
    port
    socket_protocol = 0
    starttls(sock)
    write(sock, data)

class circuits.net.sockets.TCP6Client(bind=None,      bufsize=4096,      channel='client',
                                     **kwargs)
    Bases: circuits.net.sockets.TCPClient
    parse_bind_parameter(bind_parameter)
    socket_family = 10

class circuits.net.sockets.TCP6Server(bind, secure=False, backlog=5000, bufsize=4096,
                                     channel='server', **kwargs)
    Bases: circuits.net.sockets.TCPServer
    parse_bind_parameter(bind_parameter)
    socket_family = 10

class circuits.net.sockets.TCPClient(bind=None,      bufsize=4096,      channel='client',
                                    **kwargs)
    Bases: circuits.net.sockets.Client
    connect(host, port, secure=False, **kwargs)
    init(connect_timeout=5, *args, **kwargs)
    socket_family = 2
    socket_options = [(6, 1, 1)]
    socket_protocol = 6
    socket_type = 1
```

```
class circuits.net.sockets.TCPServer(bind, secure=False, backlog=5000, bufsize=4096,
                                     channel='server', **kwargs)
    Bases: circuits.net.sockets.Server
    parse_bind_parameter(bind_parameter)
    socket_family = 2
    socket_options = [(1, 2, 1), (6, 1, 1)]
    socket_type = 1

circuits.net.sockets.UDP6Client
    alias of circuits.net.sockets.UDP6Server

class circuits.net.sockets.UDP6Server(bind, secure=False, backlog=5000, bufsize=4096,
                                       channel='server', **kwargs)
    Bases: circuits.net.sockets.UDP6Server
    parse_bind_parameter(bind_parameter)
    socket_family = 10

circuits.net.sockets.UDPClient
    alias of circuits.net.sockets.UDP6Server

class circuits.net.sockets.UDPServer(bind, secure=False, backlog=5000, bufsize=4096,
                                       channel='server', **kwargs)
    Bases: circuits.net.sockets.Server
    broadcast(data, port)
    close()
    socket_family = 2
    socket_options = [(1, 6, 1), (1, 2, 1)]
    socket_type = 2
    write(address, data)

class circuits.net.sockets.UNIXClient(bind=None, bufsize=4096, channel='client',
                                       **kwargs)
    Bases: circuits.net.sockets.Client
    connect(path, secure=False, **kwargs)
    ready(component)
    socket_family = 1
    socket_options = []
    socket_type = 1

class circuits.net.sockets.UNIXServer(bind, secure=False, backlog=5000, bufsize=4096,
                                       channel='server', **kwargs)
    Bases: circuits.net.sockets.Server
    socket_family = 1
    socket_options = [(1, 2, 1)]
    socket_type = 1

circuits.net.sockets.do_handshake(sock, on_done=None, on_error=None, extra_args=None)
    SSL Async Handshake
```

Parameters

- **on_done** – Function called when handshake is complete
- **on_error** – Function called when handshake errored

`circuits.net.sockets.parse_ipv4_parameter(bind_parameter)`

`circuits.net.sockets.parse_ipv6_parameter(bind_parameter)`

Module contents

Networking Components

This package contains components that implement network sockets and protocols for implementing client and server network applications.

circuits.node package

Submodules

circuits.node.client module

```
class circuits.node.client.Client (host,          port,          channel='node_client',          re-
                                ceive_event_firewall=None,      send_event_firewall=None,
                                **kwargs)
```

Bases: `circuits.core.components.BaseComponent`

Node Client (peer)

Create new connection for a node.

Parameters

- **hostname** (*str*) – hostname to connect.
- **port** (*int*) – port to connect.
- **channel** (*str*) – An optional keyword argument which if defined, set channel used for node event. **Default:** `node_client`
- **receive_event_firewall** (*method*) – An optional keyword argument which if defined, function or method to call for check if event is allowed for sending. **Default:** `None` (no firewall)
- **send_event_firewall** (*method*) – An optional keyword argument which if defined, function or method to call for check if event is allowed for executing **Default:** `None` (no firewall)

channel = `'node_client'`

close ()

Close the connection

connect ()

Create the connection

send (*event*)

Send event through the connection

Parameters `event` (*circuits.core.events.Event*) – Event to send.

Returns The result object of the sended event

Return type generator

circuits.node.events module

class `circuits.node.events.connected_to` (*connection_name, hostname, port, client_channel, client_obj*)

Bases: *circuits.core.events.Event*

Connected to a peer

Parameters

- **connection_name** (*str*) – Connection name.
- **hostname** (*str*) – hostname of the remote system.
- **port** (*int*) – connection port of the remote system.
- **client_channel** (*str*) – Channel used for client event.
- **client_obj** (*circuits.net.sockets.Client*) – Client object.

class `circuits.node.events.disconnected_from` (*connection_name, hostname, port, client_channel, client_obj*)

Bases: *circuits.node.events.connected_to*

Disconnected from a peer

Parameters

- **connection_name** (*str*) – Connection name.
- **hostname** (*str*) – hostname of the remote system.
- **port** (*int*) – connection port of the remote system.
- **client_channel** (*str*) – Channel used for client event.
- **client_obj** (*circuits.net.sockets.Client*) – Client object.

class `circuits.node.events.remote` (*event, connection_name, channel=None*)

Bases: *circuits.core.events.Event*

send event to a peer

Parameters

- **event** (*circuits.core.events.Event*) – Event to execute remotely.
- **connection_name** (*str*) – Connection name.
- **channel** (*str*) – Remote channel (channel to use on peer).

circuits.node.node module

Node

this module manage node (start server, add peer, ...) .. seealso:: Examples in :dir:'examples.node'

```
class circuits.node.node.Node (port=None, channel='node', **kwargs)
```

Bases: `circuits.core.components.BaseComponent`

this class manage node (start server, add peer, ...) .. seealso:: Examples in `:dir:'examples.node'`

Start node system.

Parameters

- **port** (*int*) – An optional keyword argument which if defined, start server on this port. **Default:** `None` (don't start the server)
- **server_ip** (*str*) – An optional keyword argument which define ip where the socket has listen to. **Default:** `0.0.0.0` (all ip is allowed)
- **channel** (*str*) – An optional keyword argument which if defined, set channel used for node event. **Default:** `node`
- **receive_event_firewall** (*method*) – An optional keyword argument which if defined, set function or method to call to check if event is allowed for sending. **Default:** `None` (no firewall)
- **send_event_firewall** (*method*) – An optional keyword argument which if defined, set function or method to call to check if event is allowed for executing **Default:** `None` (no firewall)

```
add (connection_name, hostname, port, **kwargs)
```

Add new peer to the node.

Parameters

- **connection_name** (*str*) – Connection name.
- **hostname** (*str*) – hostname of the remote node.
- **port** (*int*) – port of the remote node.
- **auto_remote_event** (*dict*) – An optional keyword argument which if defined, bind events automatically to remote execution. **Default:** `{ }` (no events)
- **channel** (*str*) – An optional keyword argument which if defined, set channel used for client event. If this keyword is not defined the method will generate the channel name automatically.
- **reconnect_delay** (*int*) – An optional keyword argument which if defined, set auto reconnect delay. **Default:** `10` (seconde)
- **receive_event_firewall** (*method*) – An optional keyword argument which if defined, function or method to call for check if event is allowed for sending. **Default:** `None` (no firewall)
- **send_event_firewall** (*method*) – An optional keyword argument which if defined, setfunction or method to call to check if event is allowed for executing **Default:** `None` (no firewall)

Returns Channel used on client event.

Return type `str`

```
channel = 'node'
```

```
get_connection_names ()
```

Get connections names

Returns The list of connections names

Return type list of str

get_peer (*connection_name*)
Get a client object by name

Parameters **connection_name** (*str*) – Connection name.

Returns The Client object

Return type *circuits.node.client.Client*

circuits.node.server module

```
class circuits.node.server.Server (port, server_ip='0.0.0.0', channel='node', re-  
ceive_event_firewall=None, send_event_firewall=None,  
**kwargs)
```

Bases: *circuits.core.components.BaseComponent*

Node server.

Create server on node system.

Parameters

- **port** (*int*) – start server on this port.
- **server_ip** (*str*) – An optional keyword argument which which define ip where the socket has listen to. **Default:** 0.0.0.0 (all ip is allowed)
- **channel** (*str*) – An optional keyword argument which if defined, set channel used for node event. **Default:** node
- **receive_event_firewall** (*method*) – An optional keyword argument which if defined, set function or method to call to check if event is allowed for sending **Default:** None (no firewall)
- **send_event_firewall** (*method*) – An optional keyword argument which if defined, set function or method to call to check if event is allowed for executing **Default:** None (no firewall)

channel = 'node'

get_socks ()
Get clients sockets list

Returns The list of client socket

Return type list of *socket.socket*

host

port

send (*event*, *sock*, *no_result*=False)
Send event to peer

Parameters

- **event** (*circuits.core.events.Event*) – Event to execute remotely.
- **sock** (*socket.socket*) – Client's socket (peer selection).
- **no_result** (*bool*) – An optional keyword argument which if True don't return the event result. **Default:** False (wait the result)

Returns The result of remote event

Return type generator

send_all (*event*)

Send event to all peer

Parameters **event** (*circuits.core.events.Event*) – Event to execute remotely.

send_to (*event, socks*)

Send event to multiple peer

Parameters

- **event** (*circuits.core.events.Event*) – Event to execute remotely.
- **socks** (list of `socket.socket`) – Client's socket list (peer selection).

circuits.node.utils module

`circuits.node.utils.dump_event (e, id)`

`circuits.node.utils.dump_value (v)`

`circuits.node.utils.load_event (s)`

`circuits.node.utils.load_value (v)`

Module contents

Node

Distributed processing support for circuits.

circuits.protocols package

Submodules

circuits.protocols.http module

class `circuits.protocols.http.HTTP` (*encoding='utf-8', channel='web'*)

Bases: *circuits.core.components.BaseComponent*

channel = 'web'

class `circuits.protocols.http.ResponseObject` (*headers, status, version*)

Bases: `object`

read ()

class `circuits.protocols.http.request` (**args, **kwargs*)

Bases: *circuits.core.events.Event*

request Event

An event is a message send to one or more channels. It is eventually dispatched to all components that have handlers for one of the channels and the event type.

All normal arguments and keyword arguments passed to the constructor of an event are passed on to the handler. When declaring a handler, its argument list must therefore match the arguments used for creating the event.

Every event has a `name` attribute that is used for matching the event with the handlers.

Variables

- **`channels`** – an optional attribute that may be set before firing the event. If defined (usually as a class variable), the attribute specifies the channels that the event should be delivered to as a tuple. This overrides the default behavior of sending the event to the firing component’s channel.

When an event is fired, the value in this attribute is replaced for the instance with the channels that the event is actually sent to. This information may be used e.g. when the event is passed as a parameter to a handler.

- **`value`** – this is a `circuits.core.values.Value` object that holds the results returned by the handlers invoked for the event.
- **`success`** – if this optional attribute is set to `True`, an associated event `success` (original name with “_success” appended) will automatically be fired when all handlers for the event have been invoked successfully.
- **`success_channels`** – the success event is, by default, delivered to same channels as the successfully dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.
- **`complete`** – if this optional attribute is set to `True`, an associated event `complete` (original name with “_complete” appended) will automatically be fired when all handlers for the event and all events fired by these handlers (recursively) have been invoked successfully.
- **`complete_channels`** – the complete event is, by default, delivered to same channels as the initially dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

```
class circuits.protocols.http.response(*args, **kwargs)
```

Bases: `circuits.core.events.Event`

response Event

An event is a message send to one or more channels. It is eventually dispatched to all components that have handlers for one of the channels and the event type.

All normal arguments and keyword arguments passed to the constructor of an event are passed on to the handler. When declaring a handler, its argument list must therefore match the arguments used for creating the event.

Every event has a `name` attribute that is used for matching the event with the handlers.

Variables

- **`channels`** – an optional attribute that may be set before firing the event. If defined (usually as a class variable), the attribute specifies the channels that the event should be delivered to as a tuple. This overrides the default behavior of sending the event to the firing component’s channel.

When an event is fired, the value in this attribute is replaced for the instance with the channels that the event is actually sent to. This information may be used e.g. when the event is passed as a parameter to a handler.

- **`value`** – this is a `circuits.core.values.Value` object that holds the results returned by the handlers invoked for the event.

- **success** – if this optional attribute is set to `True`, an associated event `success` (original name with “_success” appended) will automatically be fired when all handlers for the event have been invoked successfully.
- **success_channels** – the success event is, by default, delivered to same channels as the successfully dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.
- **complete** – if this optional attribute is set to `True`, an associated event `complete` (original name with “_complete” appended) will automatically be fired when all handlers for the event and all events fired by these handlers (recursively) have been invoked successfully.
- **complete_channels** – the complete event is, by default, delivered to same channels as the initially dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

circuits.protocols.irc module

Internet Relay Chat Protocol

This package implements the Internet Relay Chat Protocol or commonly known as IRC. Support for both server and client is implemented.

circuits.protocols.line module

Line Protocol

This module implements the basic Line protocol.

This module can be used in both server and client implementations.

class `circuits.protocols.line.Line(*args, **kwargs)`
Bases: `circuits.core.components.BaseComponent`

Line Protocol

Implements the Line Protocol.

Incoming data is split into lines with a splitter function. For each line of data processed a Line Event is created. Any unfinished lines are appended into an internal buffer.

A custom line splitter function can be passed to customize how data is split into lines. This function must accept two arguments, the data to process and any left over data from a previous invocation of the splitter function. The function must also return a tuple of two items, a list of lines and any left over data.

Parameters `splitter` (*function*) – a line splitter function

This Component operates in two modes. In normal operation it’s expected to be used in conjunction with components that expose a Read Event on a “read” channel with only one argument (data). Some builtin components that expose such events are: - `circuits.net.sockets.TCPClient` - `circuits.io.File`

The second mode of operation works with `circuits.net.sockets.Server` components such as `TCPServer`, `UNIXServer`, etc. It’s expected that two arguments exist in the Read Event, sock and data. The following two arguments can be passed to affect how unfinished data is stored and retrieved for such components:

Parameters `getBuffer` (*function*) – function to retrieve the buffer for a client sock

This function must accept one argument (sock,) the client socket whose buffer is to be retrieved.

Parameters `updateBuffer` (*function*) – function to update the buffer for a client sock

This function must accept two arguments (sock, buffer,) the client socket and the left over buffer to be updated.

@note: This Component must be used in conjunction with a Component that exposes Read events on a “read” Channel.

initializes x; see x.__class__.__doc__ for signature

```
class circuits.protocols.line.line(*args, **kwargs)
```

Bases: *circuits.core.events.Event*

line Event

An event is a message send to one or more channels. It is eventually dispatched to all components that have handlers for one of the channels and the event type.

All normal arguments and keyword arguments passed to the constructor of an event are passed on to the handler. When declaring a handler, its argument list must therefore match the arguments used for creating the event.

Every event has a `name` attribute that is used for matching the event with the handlers.

Variables

- **channels** – an optional attribute that may be set before firing the event. If defined (usually as a class variable), the attribute specifies the channels that the event should be delivered to as a tuple. This overrides the default behavior of sending the event to the firing component’s channel.

When an event is fired, the value in this attribute is replaced for the instance with the channels that the event is actually sent to. This information may be used e.g. when the event is passed as a parameter to a handler.

- **value** – this is a *circuits.core.values.Value* object that holds the results returned by the handlers invoked for the event.
- **success** – if this optional attribute is set to `True`, an associated event `success` (original name with “_success” appended) will automatically be fired when all handlers for the event have been invoked successfully.
- **success_channels** – the success event is, by default, delivered to same channels as the successfully dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.
- **complete** – if this optional attribute is set to `True`, an associated event `complete` (original name with “_complete” appended) will automatically be fired when all handlers for the event and all events fired by these handlers (recursively) have been invoked successfully.
- **complete_channels** – the complete event is, by default, delivered to same channels as the initially dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

```
circuits.protocols.line.splitLines(s, buffer) → lines, buffer
```

Append s to buffer and find any new lines of text in the string splitting at the standard IRC delimiter CRLF. Any new lines found, return them as a list and the remaining buffer for further processing.

circuits.protocols.websocket module

```
class circuits.protocols.websocket.WebSocketCodec(sock=None, data=bytearray(b''),
                                                    *args, **kwargs)
```

Bases: *circuits.core.components.BaseComponent*

WebSocket Protocol

Implements the Data Framing protocol for WebSocket.

This component is used in conjunction with a parent component that receives Read events on its channel. When created (after a successful WebSocket setup handshake), the codec registers a handler on the parent's channel that filters out these Read events for a given socket (if used in a server) or all Read events (if used in a client). The data is decoded and the contained payload is emitted as Read events on the codec's channel.

The data from write events sent to the codec's channel (with socket argument if used in a server) is encoded according to the WebSocket Data Framing protocol. The encoded data is then forwarded as write events on the parents channel.

Creates a new codec.

Parameters `sock` – the socket used in Read and write events (if used in a server, else None)

`channel = 'ws'`

Module contents

Networking Protocols

This package contains components that implement various networking protocols.

circuits.tools package

Module contents

Circuits Tools

circuits.tools contains a standard set of tools for circuits. These tools are installed as executables with a prefix of “circuits.”

`circuits.tools.deprecated(f)`

`circuits.tools.edges(x, e=None, v=None, d=0)`

`circuits.tools.findroot(x)`

`circuits.tools.getargspec(func)`

`circuits.tools.graph(x, name=None)`

Parameters

- `x` (`Component` or `Manager`) – A Component or Manager to graph
- `name` (`str`) – A name for the graph (defaults to `x`'s name)

`circuits.tools.graph_ascii(x)`

Display a directed graph of the Component structure of `x`

Parameters `x` (`Component` or `Manager`) – A Component or Manager to graph

@return: A directed graph representing `x`'s Component structure. @rtype: `str`

`circuits.tools.graph_dot(x, name=None)`

Parameters

- `x` (`Component` or `Manager`) – A Component or Manager to graph
- `name` (`str`) – A name for the graph (defaults to `x`'s name)

`circuits.tools.graph_png(x, name=None)`

Parameters

- **x** (`Component` or `Manager`) – A Component or Manager to graph
- **name** (`str`) – A name for the graph (defaults to x's name)

`circuits.tools.inspect(x)`

Display an inspection report of the Component or Manager x

Parameters **x** (`Component` or `Manager`) – A Component or Manager to graph

@return: A detailed inspection report of x @rtype: str

`circuits.tools.kill(x)`

`circuits.tools.tryimport(modules, obj=None, message=None)`

`circuits.tools.walk(x, f, d=0, v=None)`

circuits.web package

Subpackages

circuits.web.dispatchers package

Submodules

circuits.web.dispatchers.dispatcher module

Dispatcher

This module implements a basic URL to Channel dispatcher. This is the default dispatcher used by circuits.web

class `circuits.web.dispatchers.dispatcher.Dispatcher` (***kwargs*)

Bases: `circuits.core.components.BaseComponent`

channel = 'web'

`circuits.web.dispatchers.dispatcher.find_handlers(req, paths)`

`circuits.web.dispatchers.dispatcher.resolve_methods(parts)`

`circuits.web.dispatchers.dispatcher.resolve_path(paths, parts)`

circuits.web.dispatchers.jsonrpc module

JSON RPC

This module implements a JSON RPC dispatcher that translates incoming RPC calls over JSON into RPC events.

class `circuits.web.dispatchers.jsonrpc.JSONRPC` (*path=None*, *encoding='utf-8'*,
rpc_channel=''*)

Bases: `circuits.core.components.BaseComponent`

channel = 'web'

```
class circuits.web.dispatchers.jsonrpc.rpc(*args, **kwargs)
```

Bases: `circuits.core.events.Event`

RPC Event

An event is a message send to one or more channels. It is eventually dispatched to all components that have handlers for one of the channels and the event type.

All normal arguments and keyword arguments passed to the constructor of an event are passed on to the handler. When declaring a handler, its argument list must therefore match the arguments used for creating the event.

Every event has a `name` attribute that is used for matching the event with the handlers.

Variables

- **`channels`** – an optional attribute that may be set before firing the event. If defined (usually as a class variable), the attribute specifies the channels that the event should be delivered to as a tuple. This overrides the default behavior of sending the event to the firing component’s channel.

When an event is fired, the value in this attribute is replaced for the instance with the channels that the event is actually sent to. This information may be used e.g. when the event is passed as a parameter to a handler.

- **`value`** – this is a `circuits.core.values.Value` object that holds the results returned by the handlers invoked for the event.
- **`success`** – if this optional attribute is set to `True`, an associated event `success` (original name with “_success” appended) will automatically be fired when all handlers for the event have been invoked successfully.
- **`success_channels`** – the success event is, by default, delivered to same channels as the successfully dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.
- **`complete`** – if this optional attribute is set to `True`, an associated event `complete` (original name with “_complete” appended) will automatically be fired when all handlers for the event and all events fired by these handlers (recursively) have been invoked successfully.
- **`complete_channels`** – the complete event is, by default, delivered to same channels as the initially dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

circuits.web.dispatchers.static module

Static

This `modStatic` implements a Static dispatcher used to serve up static resources and an optional apache-style directory listing.

```
class circuits.web.dispatchers.static.Static(path=None, docroot=None, de-
                                           faults=('index.html', 'index.xhtml'),
                                           dirlisting=False, **kwargs)
```

Bases: `circuits.core.components.BaseComponent`

```
channel = 'web'
```

circuits.web.dispatchers.virtualhosts module

VirtualHost

This module implements a virtual host dispatcher that sends requests for configured virtual hosts to different dispatchers.

class `circuits.web.dispatchers.virtualhosts.VirtualHosts` (*domains*)

Bases: `circuits.core.components.BaseComponent`

Forward to another Dispatcher based on the Host header.

This can be useful when running multiple sites within one server. It allows several domains to point to different parts of a single website structure. For example: - `http://www.domain.example` -> / - `http://www.domain2.example` -> /domain2 - `http://www.domain2.example:443` -> /secure

Parameters *domains* (*dict*) – a dict of {host header value: virtual prefix} pairs.

The incoming “Host” request header is looked up in this dict, and, if a match is found, the corresponding “virtual prefix” value will be prepended to the URL path before passing the request onto the next dispatcher.

Note that you often need separate entries for “example.com” and “www.example.com”. In addition, “Host” headers may contain the port number.

channel = 'web'

circuits.web.dispatchers.xmlrpc module

XML RPC

This module implements a XML RPC dispatcher that translates incoming RPC calls over XML into RPC events.

class `circuits.web.dispatchers.xmlrpc.XMLRPC` (*path=None*, *encoding='utf-8'*,
rpc_channel=''*)

Bases: `circuits.core.components.BaseComponent`

channel = 'web'

class `circuits.web.dispatchers.xmlrpc.rpc` (**args*, ***kwargs*)

Bases: `circuits.core.events.Event`

rpc Event

An event is a message sent to one or more channels. It is eventually dispatched to all components that have handlers for one of the channels and the event type.

All normal arguments and keyword arguments passed to the constructor of an event are passed on to the handler. When declaring a handler, its argument list must therefore match the arguments used for creating the event.

Every event has a `name` attribute that is used for matching the event with the handlers.

Variables

- **channels** – an optional attribute that may be set before firing the event. If defined (usually as a class variable), the attribute specifies the channels that the event should be delivered to as a tuple. This overrides the default behavior of sending the event to the firing component’s channel.

When an event is fired, the value in this attribute is replaced for the instance with the channels that the event is actually sent to. This information may be used e.g. when the event is passed as a parameter to a handler.

- **value** – this is a `circuits.core.values.Value` object that holds the results returned by the handlers invoked for the event.

- **success** – if this optional attribute is set to `True`, an associated event `success` (original name with “_success” appended) will automatically be fired when all handlers for the event have been invoked successfully.
- **success_channels** – the success event is, by default, delivered to same channels as the successfully dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.
- **complete** – if this optional attribute is set to `True`, an associated event `complete` (original name with “_complete” appended) will automatically be fired when all handlers for the event and all events fired by these handlers (recursively) have been invoked successfully.
- **complete_channels** – the complete event is, by default, delivered to same channels as the initially dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

Module contents

Dispatchers

This package contains various `circuits.web` dispatchers. By default a `circuits.web.Server` Component uses the `dispatcher.Dispatcher`

circuits.web.parsers package

Submodules

circuits.web.parsers.http module

```
class circuits.web.parsers.http.HttpParser (kind=2, decompress=False)
    Bases: object

    execute (data, length)

    get_headers ()

    get_method ()

    get_path ()

    get_query_string ()

    get_scheme ()

    get_status_code ()

    get_url ()

    get_version ()

    is_chunked ()
        return True if Transfer-Encoding header value is chunked

    is_headers_complete ()
        return True if all headers have been parsed.

    is_message_begin ()
        return True if the parsing start
```

```

is_message_complete()
    return True if the parsing is done (we get EOF)

is_partial_body()
    return True if a chunk of body have been parsed

is_upgrade()
    Do we get upgrade header in the request. Useful for websockets

recv_body()
    return last chunk of the parsed body

recv_body_into(barray)
    Receive the last chunk of the parsed body and store the data in a buffer rather than creating a new string.

should_keep_alive()
    return True if the connection should be kept alive

exception circuits.web.parsers.http.InvalidChunkSize
    Bases: exceptions.Exception
    error raised when we parse an invalid chunk size

exception circuits.web.parsers.http.InvalidHeader
    Bases: exceptions.Exception
    error raised on invalid header

exception circuits.web.parsers.http.InvalidRequestLine
    Bases: exceptions.Exception
    error raised when first line is invalid

```

circuits.web.parsers.multipart module

Parser for multipart/form-data

This module provides a parser for the multipart/form-data format. It can read from a file, a socket or a WSGI environment. The parser can be used to replace `cgi.FieldStorage` (without the bugs) and works with Python 2.5+ and 3.x (2to3).

Licence (MIT)

Copyright (c) 2010, Marcel Hellkamp. Inspired by the Werkzeug library: <http://werkzeug.pocoo.org/>

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OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

class `circuits.web.parsers.multipart.MultiDict(*a, **k)`

Bases: `_abcoll.MutableMapping`

A dict that remembers old values for each key

append (*key, value*)

get (*k*, *d*) → D[k] if k in D, else d. d defaults to None.

getall (*key*)

iterallitems ()

keys () → list of D's keys

replace (*key, value*)

exception `circuits.web.parsers.multipart.MultipartError`

Bases: `exceptions.ValueError`

class `circuits.web.parsers.multipart.MultipartParser` (*stream*, *boundary*,
content_length=-1,
disk_limit=1073741824,
mem_limit=1048576,
memfile_limit=262144,
buffer_size=65536,
charset='latin1')

Bases: `object`

Parse a multipart/form-data byte stream. This object is an iterator over the parts of the message.

Parameters

- **stream** – A file-like stream. Must implement `.read(size)`.
- **boundary** – The multipart boundary as a byte string.
- **content_length** – The maximum number of bytes to read.

get (*name*, *default=None*)

Return the first part with that name or a default value (None).

get_all (*name*)

Return a list of parts with that name.

parts ()

Returns a list with all parts of the multipart message.

class `circuits.web.parsers.multipart.MultipartPart` (*buffer_size=65536*,
memfile_limit=262144,
charset='latin1')

Bases: `object`

feed (*line*, *nl=""*)

finish_header ()

is_buffered ()

Return true if the data is fully buffered in memory.

save_as (*path*)

value

Data decoded with the specified charset

write_body (*line*, *nl*)

write_header (*line*, *nl*)

`circuits.web.parsers.multipart.copy_file` (*stream*, *target*, *maxread=-1*, *buffer_size=32*)

Read from `:stream` and write to `:target` until `:maxread` or EOF.

`circuits.web.parsers.multipart.header_quote` (*val*)

`circuits.web.parsers.multipart.header_unquote` (*val*, *filename=False*)

`circuits.web.parsers.multipart.parse_form_data` (*environ*, *charset='utf8'*, *strict=False*,
***kw*)

Parse form data from an environ dict and return a (forms, files) tuple. Both tuple values are dictionaries with the form-field name as a key (text_type) and lists as values (multiple values per key are possible). The forms-dictionary contains form-field values as text_type strings. The files-dictionary contains *MultipartPart* instances, either because the form-field was a file-upload or the value is too big to fit into memory limits.

Parameters

- **environ** – An WSGI environment dict.
- **charset** – The charset to use if unsure. (default: utf8)
- **strict** – If True, raise *MultipartError* on any parsing errors. These are silently ignored by default.

`circuits.web.parsers.multipart.parse_options_header` (*header*, *options=None*)

`circuits.web.parsers.multipart.tob` (*data*, *enc='utf8'*)

circuits.web.parsers.querystring module

class `circuits.web.parsers.querystring.QueryStringParser` (*data*)

Bases: object

parse (*key*, *value*)

process (*pair*)

tokens (*key*)

class `circuits.web.parsers.querystring.QueryStringToken`

Bases: object

ARRAY = 'ARRAY'

KEY = 'KEY'

OBJECT = 'OBJECT'

Module contents

`circuits.web.parsers`

circuits.web.websockets package

Submodules

circuits.web.websockets.client module

```
class circuits.web.websockets.client.WebSocketClient(url, channel='wsclient',  
                                                    wchannel='ws', headers=None)
```

Bases: *circuits.core.components.BaseComponent*

An RFC 6455 compliant WebSocket client component. Upon receiving a `circuits.web.client.Connect` event, the component tries to establish the connection to the server in a two stage process. First, a *circuits.net.events.connect* event is sent to a child *TCPClient*. When the TCP connection has been established, the HTTP request for opening the WebSocket is sent to the server. A failure in this setup process is signaled by raising an *NotConnected* exception.

When the server accepts the request, the WebSocket connection is established and can be used very much like an ordinary socket by handling *read* events on and sending *write* events to the channel specified as the `wchannel` parameter of the constructor. Firing a *close* event on that channel closes the connection in an orderly fashion (i.e. as specified by the WebSocket protocol).

Parameters

- **url** – the URL to connect to.
- **channel** – the channel used by this component
- **wchannel** – the channel used for the actual WebSocket communication (read, write, close events)
- **headers** – additional headers to be passed with the WebSocket setup HTTP request

```
channel = 'wsclient'
```

```
close()
```

```
connected
```

circuits.web.websockets.dispatcher module

```
class circuits.web.websockets.dispatcher.WebSocketsDispatcher(path=None,  
                                                             wchan-  
                                                             nel='wsserver',  
                                                             *args, **kwargs)
```

Bases: *circuits.core.components.BaseComponent*

This class implements an RFC 6455 compliant WebSockets dispatcher that handles the WebSockets handshake and upgrades the connection.

The dispatcher listens on its channel for `Request` events and tries to match them with a given path. Upon a match, the request is checked for the proper Opening Handshake information. If successful, the dispatcher confirms the establishment of the connection to the client. Any subsequent data from the client is handled as a WebSocket data frame, decoded and fired as a `Read` event on the `wchannel` passed to the constructor. The data from *write* events on that channel is encoded as data frames and forwarded to the client.

Firing a `Close` event on the `wchannel` closes the connection in an orderly fashion (i.e. as specified by the WebSocket protocol).

Parameters

- **path** – the path to handle. Requests that start with this path are considered to be WebSocket Opening Handshakes.
- **wschannel** – the channel on which `read` events from the client will be delivered and where `write` events to the client will be sent to.

```
channel = 'web'
select_subprotocol(subprotocols)
```

Module contents

circuits.web websockets

Submodules**circuits.web.client module**

```
class circuits.web.client.Client(channel='client')
    Bases: circuits.core.components.BaseComponent
    channel = 'client'
    close()
    connect(event, host=None, port=None, secure=None)
    connected
    request(method, url, body=None, headers=None)
    response
    write(data)

exception circuits.web.client.HTTPException
    Bases: exceptions.Exception

exception circuits.web.client.NotConnected
    Bases: circuits.web.client.HTTPException

circuits.web.client.parse_url(url)

class circuits.web.client.request(method, path, body=None, headers=None)
    Bases: circuits.core.events.Event
    request Event
    This Event is used to initiate a new request.
```

Parameters

- **method** (*str*) – HTTP Method (PUT, GET, POST, DELETE)
- **url** (*str*) – Request URL

`x.__init__(...)` initializes `x`; see `x.__class__.__doc__` for signature

circuits.web.constants module

Global Constants

This module implements required shared global constants.

circuits.web.controllers module

Controllers

This module implements ...

```
class circuits.web.controllers.BaseController (*args, **kwargs)
    Bases: circuits.core.components.BaseComponent
    initializes x; see x.__class__.__doc__ for signature
    channel = '/'
    expires (secs=0, force=False)
    forbidden (description=None)
        Return a 403 (Forbidden) response
        Parameters description (str) – Message to display
    notfound (description=None)
        Return a 404 (Not Found) response
        Parameters description (str) – Message to display
    redirect (urls, code=None)
        Return a 30x (Redirect) response
        Redirect to another location specified by urls with an optional custom response code.
        Parameters
        • urls (str or list) – A single URL or list of URLs
        • code (int) – HTTP Redirect code
    serve_download (path, name=None)
    serve_file (path, type=None, disposition=None, name=None)
    uri
        Return the current Request URI
    See also:
        circuits.web.url.URL

class circuits.web.controllers.Controller (*args, **kwargs)
    Bases: circuits.web.controllers.BaseController
    initializes x; see x.__class__.__doc__ for signature

class circuits.web.controllers.ExposeJSONMetaClass (name, bases, dct)
    Bases: type

class circuits.web.controllers.ExposeMetaClass (name, bases, dct)
    Bases: type
```

```
class circuits.web.controllers.JSONController(*args, **kwargs)
    Bases: circuits.web.controllers.BaseController

    initializes x; see x.__class__.__doc__ for signature

circuits.web.controllers.expose(*channels, **config)
circuits.web.controllers.exposeJSON(*channels, **config)
```

circuits.web.errors module

Errors

This module implements a set of standard HTTP Errors.

```
class circuits.web.errors.forbidden(request, response, code=None, **kwargs)
    Bases: circuits.web.errors.httperror

    An event for signaling the HTTP Forbidden error

    The constructor creates a new instance and modifies the response argument to reflect the error.

    code = 403
```

```
class circuits.web.errors.httperror(request, response, code=None, **kwargs)
    Bases: circuits.core.events.Event

    An event for signaling an HTTP error

    The constructor creates a new instance and modifies the response argument to reflect the error.

    code = 500

    description = ''

    sanitize()
```

```
class circuits.web.errors.notfound(request, response, code=None, **kwargs)
    Bases: circuits.web.errors.httperror

    An event for signaling the HTTP Not Found error

    The constructor creates a new instance and modifies the response argument to reflect the error.

    code = 404
```

```
class circuits.web.errors.redirect(request, response, url, code=None)
    Bases: circuits.web.errors.httperror

    An event for signaling the HTTP Redirect response

    The constructor creates a new instance and modifies the response argument to reflect a redirect response to the given url.
```

```
class circuits.web.errors.unauthorized(request, response, code=None, **kwargs)
    Bases: circuits.web.errors.httperror

    An event for signaling the HTTP Unauthorized error

    The constructor creates a new instance and modifies the response argument to reflect the error.

    code = 401
```

circuits.web.events module

Events

This module implements the necessary Events needed.

class `circuits.web.events.request` (*Event*) → request Event

Bases: `circuits.core.events.Event`

args: request, response

An event is a message send to one or more channels. It is eventually dispatched to all components that have handlers for one of the channels and the event type.

All normal arguments and keyword arguments passed to the constructor of an event are passed on to the handler. When declaring a handler, its argument list must therefore match the arguments used for creating the event.

Every event has a `name` attribute that is used for matching the event with the handlers.

Variables

- **`channels`** – an optional attribute that may be set before firing the event. If defined (usually as a class variable), the attribute specifies the channels that the event should be delivered to as a tuple. This overrides the default behavior of sending the event to the firing component’s channel.

When an event is fired, the value in this attribute is replaced for the instance with the channels that the event is actually sent to. This information may be used e.g. when the event is passed as a parameter to a handler.

- **`value`** – this is a `circuits.core.values.Value` object that holds the results returned by the handlers invoked for the event.
- **`success`** – if this optional attribute is set to `True`, an associated event `success` (original name with “_success” appended) will automatically be fired when all handlers for the event have been invoked successfully.
- **`success_channels`** – the success event is, by default, delivered to same channels as the successfully dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.
- **`complete`** – if this optional attribute is set to `True`, an associated event `complete` (original name with “_complete” appended) will automatically be fired when all handlers for the event and all events fired by these handlers (recursively) have been invoked successfully.
- **`complete_channels`** – the complete event is, by default, delivered to same channels as the initially dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

`complete = True`

`failure = True`

`success = True`

class `circuits.web.events.response` (*Event*) → response Event

Bases: `circuits.core.events.Event`

args: request, response

An event is a message send to one or more channels. It is eventually dispatched to all components that have handlers for one of the channels and the event type.

All normal arguments and keyword arguments passed to the constructor of an event are passed on to the handler. When declaring a handler, its argument list must therefore match the arguments used for creating the event.

Every event has a `name` attribute that is used for matching the event with the handlers.

Variables

- **`channels`** – an optional attribute that may be set before firing the event. If defined (usually as a class variable), the attribute specifies the channels that the event should be delivered to as a tuple. This overrides the default behavior of sending the event to the firing component’s channel.

When an event is fired, the value in this attribute is replaced for the instance with the channels that the event is actually sent to. This information may be used e.g. when the event is passed as a parameter to a handler.

- **`value`** – this is a `circuits.core.values.Value` object that holds the results returned by the handlers invoked for the event.
- **`success`** – if this optional attribute is set to `True`, an associated event `success` (original name with “_success” appended) will automatically be fired when all handlers for the event have been invoked successfully.
- **`success_channels`** – the success event is, by default, delivered to same channels as the successfully dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.
- **`complete`** – if this optional attribute is set to `True`, an associated event `complete` (original name with “_complete” appended) will automatically be fired when all handlers for the event and all events fired by these handlers (recursively) have been invoked successfully.
- **`complete_channels`** – the complete event is, by default, delivered to same channels as the initially dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

```
complete = True
```

```
failure = True
```

```
success = True
```

```
class circuits.web.events.stream(Event) → stream Event
```

Bases: `circuits.core.events.Event`

args: request, response

An event is a message send to one or more channels. It is eventually dispatched to all components that have handlers for one of the channels and the event type.

All normal arguments and keyword arguments passed to the constructor of an event are passed on to the handler. When declaring a handler, its argument list must therefore match the arguments used for creating the event.

Every event has a `name` attribute that is used for matching the event with the handlers.

Variables

- **`channels`** – an optional attribute that may be set before firing the event. If defined (usually as a class variable), the attribute specifies the channels that the event should be delivered to as a tuple. This overrides the default behavior of sending the event to the firing component’s channel.

When an event is fired, the value in this attribute is replaced for the instance with the channels that the event is actually sent to. This information may be used e.g. when the event is passed as a parameter to a handler.

- **value** – this is a `circuits.core.values.Value` object that holds the results returned by the handlers invoked for the event.
- **success** – if this optional attribute is set to `True`, an associated event `success` (original name with “_success” appended) will automatically be fired when all handlers for the event have been invoked successfully.
- **success_channels** – the success event is, by default, delivered to same channels as the successfully dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.
- **complete** – if this optional attribute is set to `True`, an associated event `complete` (original name with “_complete” appended) will automatically be fired when all handlers for the event and all events fired by these handlers (recursively) have been invoked successfully.
- **complete_channels** – the complete event is, by default, delivered to same channels as the initially dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

```
complete = True
```

```
failure = True
```

```
success = True
```

```
class circuits.web.events.terminate(*args, **kwargs)
```

Bases: `circuits.core.events.Event`

terminate Event

An event is a message send to one or more channels. It is eventually dispatched to all components that have handlers for one of the channels and the event type.

All normal arguments and keyword arguments passed to the constructor of an event are passed on to the handler. When declaring a handler, its argument list must therefore match the arguments used for creating the event.

Every event has a `name` attribute that is used for matching the event with the handlers.

Variables

- **channels** – an optional attribute that may be set before firing the event. If defined (usually as a class variable), the attribute specifies the channels that the event should be delivered to as a tuple. This overrides the default behavior of sending the event to the firing component’s channel.

When an event is fired, the value in this attribute is replaced for the instance with the channels that the event is actually sent to. This information may be used e.g. when the event is passed as a parameter to a handler.

- **value** – this is a `circuits.core.values.Value` object that holds the results returned by the handlers invoked for the event.
- **success** – if this optional attribute is set to `True`, an associated event `success` (original name with “_success” appended) will automatically be fired when all handlers for the event have been invoked successfully.
- **success_channels** – the success event is, by default, delivered to same channels as the successfully dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.
- **complete** – if this optional attribute is set to `True`, an associated event `complete` (original name with “_complete” appended) will automatically be fired when all handlers for the event and all events fired by these handlers (recursively) have been invoked successfully.

- **complete_channels** – the complete event is, by default, delivered to same channels as the initially dispatched event itself. This may be overridden by specifying an alternative list of destinations using this attribute.

circuits.web.exceptions module

Exceptions

This module implements a set of standard HTTP Errors as Python Exceptions.

Note: This code is mostly borrowed from werkzeug and adapted for circuits.web

exception `circuits.web.exceptions.Redirect` (*urls, status=None*)

Bases: `circuits.web.exceptions.HTTPException`

code = 303

exception `circuits.web.exceptions.RequestTimeout` (*description=None, traceback=None*)

Bases: `circuits.web.exceptions.HTTPException`

408 Request Timeout

Raise to signalize a timeout.

code = 408

description = "<p>The server closed the network connection because the browser didn't

exception `circuits.web.exceptions.RequestEntityTooLarge` (*description=None, traceback=None*)

Bases: `circuits.web.exceptions.HTTPException`

413 Request Entity Too Large

The status code one should return if the data submitted exceeded a given limit.

code = 413

description = '<p>The data value transmitted exceeds the capacity limit.</p>'

exception `circuits.web.exceptions.ServiceUnavailable` (*description=None, traceback=None*)

Bases: `circuits.web.exceptions.HTTPException`

503 Service Unavailable

Status code you should return if a service is temporarily unavailable.

code = 503

description = '<p>The server is temporarily unable to service your request due to main

exception `circuits.web.exceptions.UnsupportedMediaType` (*description=None, traceback=None*)

Bases: `circuits.web.exceptions.HTTPException`

415 Unsupported Media Type

The status code returned if the server is unable to handle the media type the client transmitted.

code = 415

description = '<p>The server does not support the media type transmitted in the request

exception `circuits.web.exceptions.RequestURITooLarge` (*description=None, traceback=None*)

Bases: `circuits.web.exceptions.HTTPException`

414 Request URI Too Large

Like *413* but for too long URLs.

code = 414

description = '<p>The length of the requested URL exceeds the capacity limit for this

exception `circuits.web.exceptions.BadGateway` (*description=None, traceback=None*)

Bases: `circuits.web.exceptions.HTTPException`

502 Bad Gateway

If you do proxying in your application you should return this status code if you received an invalid response from the upstream server it accessed in attempting to fulfill the request.

code = 502

description = '<p>The proxy server received an invalid response from an upstream server

exception `circuits.web.exceptions.HTTPException` (*description=None, traceback=None*)

Bases: `exceptions.Exception`

Baseclass for all HTTP exceptions. This exception can be called by WSGI applications to render a default error page or you can catch the subclasses of it independently and render nicer error messages.

code = None

description = None

name

The status name.

traceback = True

exception `circuits.web.exceptions.UnicodeError` (*description=None, traceback=None*)

Bases: `circuits.web.exceptions.HTTPException`

raised by the request functions if they were unable to decode the incoming data properly.

exception `circuits.web.exceptions.NotAcceptable` (*description=None, traceback=None*)

Bases: `circuits.web.exceptions.HTTPException`

406 Not Acceptable

Raise if the server can't return any content conforming to the *Accept* headers of the client.

code = 406

description = '<p>The resource identified by the request is only capable of generating

exception `circuits.web.exceptions.BadRequest` (*description=None, traceback=None*)

Bases: `circuits.web.exceptions.HTTPException`

400 Bad Request

Raise if the browser sends something to the application the application or server cannot handle.

code = 400

description = '<p>The browser (or proxy) sent a request that this server could not und

exception `circuits.web.exceptions.RangeUnsatisfiable` (*description=None, traceback=None*)

Bases: `circuits.web.exceptions.HTTPException`

416 Range Unsatisfiable

The status code returned if the server is unable to satisfy the request range

code = 416

description = '<p>The server cannot satisfy the request range(s).</p>'

exception `circuits.web.exceptions.Unauthorized` (*description=None, traceback=None*)

Bases: `circuits.web.exceptions.HTTPException`

401 Unauthorized

Raise if the user is not authorized. Also used if you want to use HTTP basic auth.

code = 401

description = "<p>The server could not verify that you are authorized to access the UR

exception `circuits.web.exceptions.Gone` (*description=None, traceback=None*)

Bases: `circuits.web.exceptions.HTTPException`

410 Gone

Raise if a resource existed previously and went away without new location.

code = 410

description = '<p>The requested URL is no longer available on this server and there is

exception `circuits.web.exceptions.PreconditionFailed` (*description=None, traceback=None*)

Bases: `circuits.web.exceptions.HTTPException`

412 Precondition Failed

Status code used in combination with If-Match, If-None-Match, or If-Unmodified-Since.

code = 412

description = '<p>The precondition on the request for the URL failed positive evaluati

exception `circuits.web.exceptions.InternalServerError` (*description=None, traceback=None*)

Bases: `circuits.web.exceptions.HTTPException`

500 Internal Server Error

Raise if an internal server error occurred. This is a good fallback if an unknown error occurred in the dispatcher.

code = 500

description = '<p>The server encountered an internal error and was unable to complete

exception `circuits.web.exceptions.MethodNotAllowed` (*method, description=None*)

Bases: `circuits.web.exceptions.HTTPException`

405 Method Not Allowed

Raise if the server used a method the resource does not handle. For example *POST* if the resource is view only. Especially useful for REST.

The first argument for this exception should be a list of allowed methods. Strictly speaking the response would be invalid if you don't provide valid methods in the header which you can do with that list.

```
code = 405

exception circuits.web.exceptions.NotFound (description=None, traceback=None)
    Bases: circuits.web.exceptions.HTTPException

    404 Not Found

    Raise if a resource does not exist and never existed.

code = 404

description = '<p>The requested URL was not found on the server.</p><p>If you entered '
exception circuits.web.exceptions.LengthRequired (description=None, traceback=None)
    Bases: circuits.web.exceptions.HTTPException

    411 Length Required

    Raise if the browser submitted data but no Content-Length header which is required for the kind of processing the server does.

code = 411

description = '<p>A request with this method requires a valid <code>Content-Length</code>'
exception circuits.web.exceptions.Forbidden (description=None, traceback=None)
    Bases: circuits.web.exceptions.HTTPException

    403 Forbidden

    Raise if the user doesn't have the permission for the requested resource but was authenticated.

code = 403

description = "<p>You don't have the permission to access the requested resource. It is forbidden."
exception circuits.web.exceptions.NotImplemented (description=None, traceback=None)
    Bases: circuits.web.exceptions.HTTPException

    501 Not Implemented

    Raise if the application does not support the action requested by the browser.

code = 501

description = '<p>The server does not support the action requested by the browser.</p>'
```

circuits.web.headers module

Headers Support

This module implements support for parsing and handling headers.

```
class circuits.web.headers.AcceptElement (value, params=None)
    Bases: circuits.web.headers.HeaderElement
```

An element (with parameters) from an Accept* header's element list.

AcceptElement objects are comparable; the more-preferred object will be “less than” the less-preferred object. They are also therefore sortable; if you sort a list of AcceptElement objects, they will be listed in priority order; the most preferred value will be first. Yes, it should have been the other way around, but it's too late to fix now.

```
classmethod from_str (elementstr)
    Construct an instance from a string of the form 'token;key=val'.
```

qvalue

The qvalue, or priority, of this value.

class `circuits.web.headers.CaseInsensitiveDict` (*args, **kwargs)

Bases: dict

A case-insensitive dict subclass.

Each key is changed on entry to `str(key).title()`.

classmethod `fromkeys` (*S*, *v*) → New dict with keys from *S* and values equal to *v*.
v defaults to None.

get (*k*, *d*) → *D*[*k*] if *k* in *D*, else *d*. *d* defaults to None.

pop (*k*, *d*) → *v*, remove specified key and return the corresponding value.
 If key is not found, *d* is returned if given, otherwise `KeyError` is raised

setdefault (*k*, *d*) → *D*.get(*k*,*d*), also set *D*[*k*]=*d* if *k* not in *D*

update (*E*, ***F*) → None. Update *D* from dict/iterable *E* and *F*.
 If *E* present and has a `.keys()` method, does: for *k* in *E*: *D*[*k*] = *E*[*k*] If *E* present and lacks `.keys()` method,
 does: for (*k*, *v*) in *E*: *D*[*k*] = *v* In either case, this is followed by: for *k* in *F*: *D*[*k*] = *F*[*k*]

class `circuits.web.headers.HeaderElement` (*value*, *params*=None)

Bases: object

An element (with parameters) from an HTTP header's element list.

classmethod `from_str` (*elementstr*)
 Construct an instance from a string of the form 'token;key=val'.

static parse (*elementstr*)
 Transform 'token;key=val' to ('token', {'key': 'val'}).

class `circuits.web.headers.Headers` (*args, **kwargs)

Bases: `circuits.web.headers.CaseInsensitiveDict`

This class implements a storage for headers as key value pairs. The underlying model of a case insensitive dict matches the requirements for headers quite well, because usually header keys are unique. If several values may be associated with a header key, most HTTP headers represent the values as an enumeration using a comma as item separator.

There is, however one exception (currently) to this rule. In order to set several cookies, there should be multiple headers with the same key, each setting one cookie ("Set-Cookie: some_cookie").

This is modeled by having either a string (common case) or a list (cookie case) as value in the underlying dict. In order to allow easy iteration over all headers as they appear in the HTTP request, the `items()` method expands associated lists of values. So if you have { "Set-Cookie": ["cookie1", "cookie2"] }, the `items()` method returns the two pairs ("Set-Cookie", "cookie1") and ("Set-Cookie", "cookie2"). This is convenient for most use cases. The only drawback is that `len(keys())` is not equal to `len(items())` for this specialized dict.

add_header (*_name*, *_value*, ***_params*)

Extended header setting.

_name is the header field to add. keyword arguments can be used to set additional parameters for the header field, with underscores converted to dashes. Normally the parameter will be added as key="value" unless value is None, in which case only the key will be added.

Example:

```
h.add_header('content-disposition', 'attachment', filename='bud.gif')
```

Note that unlike the corresponding ‘email.Message’ method, this does *not* handle ‘(charset, language, value)’ tuples: all values must be strings or None.

append (*key*, *value*)

If a header with the given name already exists, the value is normally appended to the existing value separated by a comma.

If, however, the already existing entry associated key with a value of type list (as is the case for “Set-Cookie”), the new value is appended to that list.

elements (*key*)

Return a sorted list of HeaderElements for the given header.

get_all (*name*)

Return a list of all the values for the named field.

items () → list of D’s (key, value) pairs, as 2-tuples

`circuits.web.headers.header_elements` (*fieldname*, *fieldvalue*)

Return a sorted HeaderElement list.

Returns a sorted HeaderElement list from a comma-separated header string.

circuits.web.http module

Hyper Text Transfer Protocol

This module implements the server side Hyper Text Transfer Protocol or commonly known as HTTP.

class `circuits.web.http.HTTP` (*server*, *encoding*=‘utf-8’, *channel*=‘web’)

Bases: `circuits.core.components.BaseComponent`

HTTP Protocol Component

Implements the HTTP server protocol and parses and processes incoming HTTP messages, creating and sending an appropriate response.

The component handles Read events on its channel and collects the associated data until a complete HTTP request has been received. It parses the request’s content and puts it in a `Request` object and creates a corresponding `Response` object. Then it emits a Request event with these objects as arguments.

The component defines several handlers that send a response back to the client.

base

channel = ‘web’

protocol

scheme

uri

version

circuits.web.loggers module

Logger Component

This module implements Logger Components.

```

class circuits.web.loggers.Logger (file=None, logger=None, **kwargs)
    Bases: circuits.core.components.BaseComponent

    channel = 'web'

    format = '%(h)s %(l)s %(u)s %(t)s "%(r)s" %(s)s %(b)s "%(f)s" "%(a)s"'

    log (response)

    log_response (response_event, value)

circuits.web.loggers.formattime ()

```

circuits.web.main module

Main

circuits.web Web Server and Testing Tool.

```

class circuits.web.main.Authentication (channel='web', realm=None, passwd=None)
    Bases: circuits.core.components.Component

    channel = 'web'

    realm = 'Secure Area'

    request (event, request, response)

    users = {'admin': '21232f297a57a5a743894a0e4a801fc3'}

class circuits.web.main.HelloWorld (*args, **kwargs)
    Bases: circuits.core.components.Component

    initializes x; see x.__class__.__doc__ for signature

    channel = 'web'

    request (request, response)

class circuits.web.main.Root (*args, **kwargs)
    Bases: circuits.web.controllers.Controller

    initializes x; see x.__class__.__doc__ for signature

    hello (event, *args, **kwargs)

circuits.web.main.main ()

circuits.web.main.parse_bind (bind)

circuits.web.main.parse_options ()

circuits.web.main.select_poller (poller)

```

circuits.web.processors module

```

circuits.web.processors.process (request, params)

circuits.web.processors.process_multipart (request, params)

circuits.web.processors.process_urlencoded (request, params, encoding='utf-8')

```

circuits.web.servers module

Web Servers

This module implements the several Web Server components.

```
class circuits.web.servers.BaseServer (bind, encoding='utf-8', secure=False, cert-  
file=None, channel='web', display_banner=True,  
bufsize=4096)
```

Bases: *circuits.core.components.BaseComponent*

Create a Base Web Server

Create a Base Web Server (HTTP) bound to the IP Address / Port or UNIX Socket specified by the 'bind' parameter.

Variables *server* – Reference to underlying Server Component

Parameters *bind* (*Instance of int, list, tuple or str*) – IP Address / Port or UNIX Socket to bind to.

The 'bind' parameter is quite flexible with what valid values it accepts.

If an int is passed, a TCPServer will be created. The Server will be bound to the Port given by the 'bind' argument and the bound interface will default (normally to "0.0.0.0").

If a list or tuple is passed, a TCPServer will be created. The Server will be bound to the Port given by the 2nd item in the 'bind' argument and the bound interface will be the 1st item.

If a str is passed and it contains the ':' character, this is assumed to be a request to bind to an IP Address / Port. A TCPServer will thus be created and the IP Address and Port will be determined by splitting the string given by the 'bind' argument.

Otherwise if a str is passed and it does not contain the ':' character, a file path is assumed and a UNIXServer is created and bound to the file given by the 'bind' argument.

x.__init__(...) initializes *x*; see *x.__class__.__doc__* for signature

channel = 'web'

display_banner

host

port

secure

```
class circuits.web.servers.FakeSock
```

```
    getpeername ()
```

```
class circuits.web.servers.Server (bind, **kwargs)
```

Bases: *circuits.web.servers.BaseServer*

Create a Web Server

Create a Web Server (HTTP) complete with the default Dispatcher to parse requests and posted form data dispatching to appropriate Controller(s).

See: *circuits.web.servers.BaseServer*

x.__init__(...) initializes *x*; see *x.__class__.__doc__* for signature

```
class circuits.web.servers.StdinServer (encoding='utf-8', channel='web')
    Bases: circuits.core.components.BaseComponent

    channel = 'web'

    host

    port

    read (data)

    secure

    write (sock, data)
```

circuits.web.sessions module

Session Components

This module implements Session Components that can be used to store and access persistent information.

```
class circuits.web.sessions.MemoryStore
    Bases: circuits.web.sessions.Store

    data

    delete (sid)
        Delete the session data identified by sid

    load (sid)
        Load the session data identified by sid

    save (sid, data)
        Save the session data identified by sid

class circuits.web.sessions.Session (sid, data, store)
    Bases: dict

    expire ()

    sid

    store

class circuits.web.sessions.Sessions (name='circuits', store=<class 'circuits.web.sessions.MemoryStore'>, channel='web')
    Bases: circuits.core.components.Component

    channel = 'web'

    name

    request (request, response)

    store

class circuits.web.sessions.Store
    Bases: object

    delete (sid)
        Delete the session data identified by sid

    load (sid)
        Load the session data identified by sid
```

save (*sid*)

Save the session data identified by *sid*

`circuits.web.sessions.create_session(request)`

Create a unique session id from the request

Returns a unique session using `uuid4()` and a `sha1()` hash of the users IP Address and User Agent in the form of *sid/who*.

`circuits.web.sessions.verify_session(request, sid)`

Verify a User's Session

This verifies the User's Session by verifying the SHA1 Hash of the User's IP Address and User-Agent match the provided Session ID.

`circuits.web.sessions.who(request, encoding='utf-8')`

Create a SHA1 Hash of the User's IP Address and User-Agent

circuits.web.tools module

Tools

This module implements tools used throughout `circuits.web`. These tools can also be used within Controllers and request handlers.

class `circuits.web.tools.ReverseProxy(*args, **kwargs)`

Bases: `circuits.core.components.BaseComponent`

initializes `x`; see `x.__class__.__doc__` for signature

headers = ('X-Real-IP', 'X-Forwarded-For')

init (*headers=None*)

Web Component for identifying the original client IP when a reverse proxy is used

Parameters headers – List of HTTP headers to read the original client IP

`circuits.web.tools.basic_auth(request, response, realm, users, encrypt=None)`

Perform Basic Authentication

If auth fails, returns an Unauthorized error with a basic authentication header.

Parameters

- **realm** (*str*) – The authentication realm.
- **users** (*dict or callable*) – A dict of the form: {username: password} or a callable returning a dict.
- **encrypt** (*callable*) – Callable used to encrypt the password returned from the user-agent. if None it defaults to a md5 encryption.

`circuits.web.tools.check_auth(request, response, realm, users, encrypt=None)`

Check Authentication

If an Authorization header contains credentials, return True, else False.

Parameters

- **realm** (*str*) – The authentication realm.
- **users** (*dict or callable*) – A dict of the form: {username: password} or a callable returning a dict.

- **encrypt** (*callable*) – Callable used to encrypt the password returned from the user-agent. if None it defaults to a md5 encryption.

`circuits.web.tools.digest_auth(request, response, realm, users)`

Perform Digest Authentication

If auth fails, raise 401 with a digest authentication header.

Parameters

- **realm** (*str*) – The authentication realm.
- **users** (*dict or callable*) – A dict of the form: {username: password} or a callable returning a dict.

`circuits.web.tools.expires(request, response, secs=0, force=False)`

Tool for influencing cache mechanisms using the ‘Expires’ header.

‘secs’ must be either an int or a `datetime.timedelta`, and indicates the number of seconds between `response.time` and when the response should expire. The ‘Expires’ header will be set to `(response.time + secs)`.

If ‘secs’ is zero, the ‘Expires’ header is set one year in the past, and the following “cache prevention” headers are also set: - ‘Pragma’: ‘no-cache’ - ‘Cache-Control’: ‘no-cache, must-revalidate’

If ‘force’ is False (the default), the following headers are checked: ‘Etag’, ‘Last-Modified’, ‘Age’, ‘Expires’. If any are already present, none of the above response headers are set.

`circuits.web.tools.gzip(response, level=4, mime_types=('text/html', 'text/plain'))`

Try to gzip the response body if Content-Type in `mime_types`.

`response.headers['Content-Type']` must be set to one of the values in the `mime_types` arg before calling this function.

No compression is performed if any of the following hold:

- The client sends no Accept-Encoding request header
- No ‘gzip’ or ‘x-gzip’ is present in the Accept-Encoding header
- No ‘gzip’ or ‘x-gzip’ with a `qvalue > 0` is present
- The ‘identity’ value is given with a `qvalue > 0`.

`circuits.web.tools.serve_download(request, response, path, name=None)`

Serve ‘path’ as an application/x-download attachment.

`circuits.web.tools.serve_file(request, response, path, type=None, disposition=None, name=None)`

Set status, headers, and body in order to serve the given file.

The Content-Type header will be set to the `type` arg, if provided. If not provided, the Content-Type will be guessed by the file extension of the ‘path’ argument.

If `disposition` is not None, the Content-Disposition header will be set to “<disposition>; filename=<name>”. If `name` is None, it will be set to the `basename` of `path`. If `disposition` is None, no Content-Disposition header will be written.

`circuits.web.tools.validate_etags(request, response, autotags=False)`

Validate the current ETag against If-Match, If-None-Match headers.

If `autotags` is True, an ETag response-header value will be provided from an MD5 hash of the response body (unless some other code has already provided an ETag header). If False (the default), the ETag will not be automatic.

WARNING: the `autotags` feature is not designed for URL’s which allow methods other than GET. For example, if a POST to the same URL returns no content, the automatic ETag will be incorrect, breaking a fundamental use

for entity tags in a possibly destructive fashion. Likewise, if you raise 304 Not Modified, the response body will be empty, the ETag hash will be incorrect, and your application will break. See <http://www.w3.org/Protocols/rfc2616/rfc2616-sec14.html#sec14.24>

`circuits.web.tools.validate_since(request, response)`

Validate the current Last-Modified against If-Modified-Since headers.

If no code has set the Last-Modified response header, then no validation will be performed.

circuits.web.url module

This is a module for dealing with urls. In particular, sanitizing them.

class `circuits.web.url.URL(scheme, host, port, path, params="", query="", fragment="")`

Bases: `object`

For more information on how and what we parse / sanitize: <http://tools.ietf.org/html/rfc1808.html>

The more up-to-date RFC is this one: <http://www.ietf.org/rfc/rfc3986.txt>

absolute()

Return True if this is a fully-qualified URL with a hostname and everything

abspath()

Clear out any `'..'` and excessive slashes from the path

canonical()

Canonicalize this url. This includes reordering parameters and args to have a consistent ordering

defrag()

Remove the fragment from this url

deparam(params=None)

Strip any of the provided parameters out of the url

encode(encoding)

Return the url in an arbitrary encoding

equiv(other)

Return true if this url is equivalent to another

escape()

Make sure that the path is correctly escaped

lower()

Lowercase the hostname

classmethod parse(url, encoding)

Parse the provided url, and return a URL instance

punycode()

Convert to punycode hostname

relative(path, encoding='utf-8')

Evaluate the new path relative to the current url

sanitize()

A shortcut to abspath, escape and lowercase

unescape()

Unescape the path

```

unicode()
    Return a unicode version of this url

unpunycode()
    Convert to an unpunycode hostname

utf8()
    Return a utf-8 version of this url

circuits.web.url.parse_url(url, encoding='utf-8')
    Parse the provided url string and return an URL object

```

circuits.web.utils module

Utilities

This module implements utility functions.

```

circuits.web.utils.average(xs)

circuits.web.utils.compress(body, compress_level)
    Compress 'body' at the given compress_level.

circuits.web.utils.dictform(form)

circuits.web.utils.get_ranges(headervalue, content_length)
    Return a list of (start, stop) indices from a Range header, or None.

    Each (start, stop) tuple will be composed of two ints, which are suitable for use in a slicing operation. That is, the header "Range: bytes=3-6", if applied against a Python string, is requesting resource[3:7]. This function will return the list [(3, 7)].

    If this function returns an empty list, you should return HTTP 416.

circuits.web.utils.is_unix_socket(path)

circuits.web.utils.parse_body(request, response, params)

circuits.web.utils.parse_qs(query_string) → dict
    Build a params dictionary from a query_string. If keep_blank_values is True (the default), keep values that are blank.

circuits.web.utils.stddev(xs)

circuits.web.utils.variance(xs)

```

circuits.web.wrappers module

Request/Response Wrappers

This module implements the Request and Response objects.

```

class circuits.web.wrappers.Body
    Bases: object

    Response Body

    encode_errors = 'strict'

class circuits.web.wrappers.HTTPStatus(status=200, reason=None)
    Bases: object

```

reason

status

class `circuits.web.wrappers.Host` (*ip, port, name=None*)

Bases: `object`

An internet address.

`name` should be the client's host name. If not available (because no DNS lookup is performed), the IP address should be used instead.

ip = `'0.0.0.0'`

name = `'unknown.tld'`

port = `80`

class `circuits.web.wrappers.Request` (*sock, method='GET', scheme='http', path='/', protocol=(1, 1), qs='', headers=None, server=None*)

Bases: `object`

Creates a new Request object to hold information about a request.

Parameters

- **sock** (*socket.socket*) – The socket object of the request.
- **method** (*str*) – The requested method.
- **scheme** (*str*) – The requested scheme.
- **path** (*str*) – The requested path.
- **protocol** (*str*) – The requested protocol.
- **qs** (*str*) – The query string of the request.

initializes `x`; see `x.__class__.__doc__` for signature

handled = `False`

host = `''`

index = `None`

local = `Host('127.0.0.1', 80, '127.0.0.1')`

login = `None`

protocol = `(1, 1)`

remote = `Host('', 0, '')`

scheme = `'http'`

script_name = `''`

server = `None`

class `circuits.web.wrappers.Response` (*sock, request*) → new Response object

Bases: `object`

A Response object that holds the response to send back to the client. This ensure that the correct data is sent in the correct order.

initializes `x`; see `x.__class__.__doc__` for signature

body

Response Body

```

    chunked = False
    close = False
    done = False
    prepare()
    status
        Response Status
    stream = False
class circuits.web.wrappers.Status
    Bases: object
    Response Status
circuits.web.wrappers.file_generator(input, chunkSize=4096)
circuits.web.wrappers.formatdate(timeval=None, localtime=False)
    Returns a date string as specified by RFC 2822, e.g.:
    Fri, 09 Nov 2001 01:08:47 -0000

    Optional timeval if given is a floating point time value as accepted by gmtime() and localtime(), otherwise the
    current time is used.

    Optional localtime is a flag that when True, interprets timeval, and returns a date relative to the local timezone
    instead of UTC, properly taking daylight savings time into account.

    Optional argument usegmt means that the timezone is written out as an ascii string, not numeric one (so "GMT"
    instead of "+0000"). This is needed for HTTP, and is only used when localtime==False.

```

circuits.web.wsgi module

WSGI Components

This module implements WSGI Components.

```

class circuits.web.wsgi.Application(*args, **kwargs)
    Bases: circuits.core.components.BaseComponent
    initializes x; see x.__class__.__doc__ for signature
    channel = 'web'
    getRequestResponse(environ)
    headerNames = {'CONTENT_LENGTH': 'Content-Length', 'CONTENT_TYPE': 'Content-Type', 'HT
    host
    init()
    on_response(event, response)
    port
    secure
    translateHeaders(environ)

```

```
class circuits.web.wsgi.Gateway(*args, **kwargs)
    Bases: circuits.core.components.BaseComponent
    initializes x; see x.__class__.__doc__ for signature
    channel = 'web'
    init(apps)
circuits.web.wsgi.create_environ(errors, path, req)
```

Module contents

Circuits Library - Web

circuits.web contains the circuits full stack web server that is HTTP and WSGI compliant.

Submodules

circuits.six module

Utilities for writing code that runs on Python 2 and 3

```
class circuits.six.Iterator
    Bases: object
    next()

class circuits.six.Module_six_moves_urllib
    Bases: module
    Create a six.moves.urllib namespace that resembles the Python 3 namespace
    error = <module 'circuits.six.moves.urllib.error' (built-in)>
    parse = <module 'circuits.six.moves.urllib.parse' (built-in)>
    request = <module 'circuits.six.moves.urllib.request' (built-in)>
    response = <module 'circuits.six.moves.urllib.response' (built-in)>
    robotparser = <module 'circuits.six.moves.urllib.robotparser' (built-in)>

class circuits.six.Module_six_moves_urllib_error(name)
    Bases: circuits.six._LazyModule
    Lazy loading of moved objects in six.moves.urllib_error
    ContentTooShortError
    HTTPError
    URLError

class circuits.six.Module_six_moves_urllib_parse(name)
    Bases: circuits.six._LazyModule
    Lazy loading of moved objects in six.moves.urllib_parse
    ParseResult
    SplitResult
    parse_qs
```

`parse_qs1`
`quote`
`quote_plus`
`splitquery`
`splittag`
`splituser`
`splitvalue`
`unquote`
`unquote_plus`
`urldefrag`
`urlencode`
`urljoin`
`urlparse`
`urlsplit`
`urlunparse`
`urlunsplit`
`uses_fragment`
`uses_netloc`
`uses_params`
`uses_query`
`uses_relative`

class `circuits.six.Module_six_moves_urllib_request` (*name*)

Bases: `circuits.six._LazyModule`

Lazy loading of moved objects in `six.moves.urllib_request`

AbstractBasicAuthHandler

AbstractDigestAuthHandler

BaseHandler

CacheFTPHandler

FTPHandler

FancyURLopener

FileHandler

HTTPBasicAuthHandler

HTTPCookieProcessor

HTTPDefaultErrorHandler

HTTPDigestAuthHandler

HTTPErrorProcessor

```
HTTPHandler
HTTPPasswordMgr
HTTPPasswordMgrWithDefaultRealm
HTTPRedirectHandler
HTTPSHandler
OpenerDirector
ProxyBasicAuthHandler
ProxyDigestAuthHandler
ProxyHandler
Request
URLopener
UnknownHandler
build_opener
getproxies
install_opener
pathname2url
proxy_bypass
url2pathname
urlcleanup
urlopen
urlretrieve

class circuits.six.Module_six_moves_urllib_response(name)
    Bases: circuits.six._LazyModule
    Lazy loading of moved objects in six.moves.urllib_response
    addbase
    addclosehook
    addinfo
    addinfourl

class circuits.six.Module_six_moves_urllib_robotparser(name)
    Bases: circuits.six._LazyModule
    Lazy loading of moved objects in six.moves.urllib_robotparser
    RobotFileParser

class circuits.six.MovedAttribute(name, old_mod, new_mod, old_attr=None,
                                   new_attr=None)
    Bases: circuits.six._LazyDescr

class circuits.six.MovedModule(name, old, new=None)
    Bases: circuits.six._LazyDescr
```

```

circuits.six.add_metaclass(metaclass)
    Class decorator for creating a class with a metaclass.

circuits.six.add_move(move)
    Add an item to six.moves.

circuits.six.assertCountEqual(self, *args, **kwargs)
circuits.six.assertRaisesRegex(self, *args, **kwargs)
circuits.six.assertRegex(self, *args, **kwargs)

circuits.six.b(s)
    Byte literal

circuits.six.byte2int(bs)

circuits.six.create_bound_method(func, obj)
circuits.six.create_unbound_method(func, cls)

circuits.six.exec_(_code_, _globals_=None, _locs_=None)
    Execute code in a namespace.

circuits.six.get_unbound_function(unbound)
    Get the function out of a possibly unbound function

circuits.six.indexbytes(buf, i)

circuits.six.iteritems(d, **kw)
    Return an iterator over the (key, value) pairs of a dictionary.

circuits.six.iterkeys(d, **kw)
    Return an iterator over the keys of a dictionary.

circuits.six.iterlists(d, **kw)
    Return an iterator over the (key, [values]) pairs of a dictionary.

circuits.six.itervalues(d, **kw)
    Return an iterator over the values of a dictionary.

circuits.six.print_(*args, **kwargs)

circuits.six.python_2_unicode_compatible(klass)
    A decorator that defines __unicode__ and __str__ methods under Python 2. Under Python 3 it does nothing.

    To support Python 2 and 3 with a single code base, define a __str__ method returning text and apply this
    decorator to the class.

circuits.six.raise_from(value, from_value)

circuits.six.remove_move(name)
    Remove item from six.moves.

circuits.six.reraise(tp, value, tb=None)
    Reraise an exception.

circuits.six.u(s)
    Text literal

circuits.six.with_metaclass(meta, *bases)
    Create a base class with a metaclass.

circuits.six.wraps(wrapped, assigned=('__module__', '__name__', '__doc__'), up-
                    dated=('__dict__',))

```

circuits.version module

Module contents

Lightweight Event driven and Asynchronous Application Framework

circuits is a **Lightweight Event** driven and **Asynchronous Application Framework** for the [Python Programming Language](#) with a strong **Component** Architecture.

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2.6 Developer Docs

So, you'd like to contribute to circuits in some way? Got a bug report? Having problems running the examples? Having problems getting circuits working in your environment?

Excellent. Here's what you need to know.

2.6.1 Development Introduction

Here's how we do things in circuits...

Communication

- [IRC Channel](#) on the [Libera.Chat IRC Network](#)
- [Developer Mailing List](#)
- [Issue Tracker](#)

Note: If you are familiar with [IRC](#) and use your own IRC Client then connect to the [Libera.Chat Network](#) and `/join #circuits`.

Standards

We use the following coding standard:

- [PEP-008](#)

We also lint our codebase with the following tools:

- [pyflakes](#)
- [pep8](#)
- [mccabe](#)

Please ensure your Development IDE or Editor has the above linters and checkers in place and enabled.

Alternatively you can use the following command line tool:

- [flake8](#)

Tools

We use the following tools to develop circuits and share code:

- **Code Sharing:** [Git](#)
- **Code Hosting and Bug Reporting:** [GitHub](#)
- **Issue Tracker:** [Issue Tracker](#)
- **Documentation Hosting:** [Read the Docs](#)
- **Package Hosting:** [Python Package Index \(PyPi\)](#)
- **Continuous Integration:** [Github Actions](#)

2.6.2 Contributing to circuits

Here's how you can contribute to circuits

Share your story

One of the best ways you can contribute to circuits is by using circuits. Share with us your story of how you've used circuits to solve a problem or create a new software solution using the circuits framework and library of components.

Submitting Bug Reports

We welcome all bug reports. We do however prefer bug reports in a clear and concise form with repeatable steps. One of the best ways you can report a bug to us is by writing a unit test (//similar to the ones in our tests//) so that we can verify the bug, fix it and commit the fix along with the test.

To submit a bug report, please [Create an Issue](#)

Writing new tests

We're not perfect, and we're still writing more tests to ensure quality code. If you'd like to help, please [Fork circuits](#), write more tests that cover more of our code base and submit a [Pull Request](#). Many Thanks!

Adding New Features

If you'd like to see a new feature added to circuits, then we'd like to hear about it~ We would like to see some discussion around any new features as well as valid use-cases. To start the discussions off, please either:

- [Chat to us on #circuits on the Libera.Chat IRC Network](#)
- or
- [Create an Issue](#)

2.6.3 Setting up a circuits Development Environment

This is the recommended way to setup a development environment for developing with or on circuits.

Note: This document *assumes* you already have a working [Python](#) environment with a minimum [Python](#) version of 2.7 as well as [pip](#) already installed.

Prerequisites

It is highly recommended that you install and use [virtualenv](#) for all your [Python](#) development and production deployments (*not just circuits*).

It is also convenient to install and use the accompanying shell scripts and tools [virtualenvwrapper](#) which adds a nice set of workflows and functions useful for both development and deployments.

```
$ pip install -U virtualenvwrapper
$ source $(which virtualenvwrapper.sh)
```

Note: You should put `source $(which virtualenvwrapper.sh)` in either your `$HOME/.bashrc` or `$HOME/.profile` depending on how you login and interact with your terminals.

In addition to the above recommendations you must also have a [Git](#) client installed and ready to use as well as your Editor/IDE of choice ready to use.

Getting Started

1. [Fork circuits](#) (*if you haven't done so already*)
2. Clone your forked repository using [Git](#)
3. Create a new virtual environment using [virtualenvwrapper](#)
4. Install the [Development Requirements](#)
5. Install circuits in “develop” mode

And you're done!

Example:

```
$ git clone git@github.com:prologic/circuits.git
$ cd circuits
$ mkvirtualenv circuits
$ pip install -r requirements-dev.txt
$ python setup.py develop
```

Alternatively if you already have [Fabric](#) installed:

```
$ git clone git@github.com:prologic/circuits.git
$ cd circuits
$ mkvirtualenv circuits
$ fab develop
```

2.6.4 Development Processes

We document all our internal development processes here so you know exactly how we work and what to expect. If you find any issues or problems please let us know!

Software Development Life Cycle (SDLC)

We employ the use of the [SCRUM Agile Process](#) and use our [Issue Tracker](#) to track features, bugs, chores and releases. If you wish to contribute to circuits, please familiarize yourself with SCRUM and [GitHub](#)'s Issue Tracker.

Bug Reports

- New Bug Reports are submitted via: <https://github.com/circuits/circuits/issues>
- Confirmation and Discussion of all New Bug Reports.
- Once confirmed, a new Bug is raised in our [Issue Tracker](#)
- An appropriate milestone will be set (*depending on current milestone's schedule and resources*)
- A unit test developed that demonstrates the bug's failure.
- A fix developed that passes the unit test and breaks no others.
- A [New Pull Request](#) created with the fix.

This must contains: - A new or modified unit test. - A patch that fixes the bug ensuring all unit tests pass. - The [Change Log](#) updated. - Appropriate documentation updated.

- The [Pull Request](#) is reviewed and approved by at least two other developers.

Feature Requests

- New Feature Requests are submitted via: <https://github.com/circuits/circuits/issues>
- Confirmation and Discussion of all New Feature Requests.
- Once confirmed, a new Feature is raised in our [Issue Tracker](#)
- An appropriate milestone will be set (*depending on current milestone's schedule and resources*)
- A unit test developed that demonstrates the new feature.
- The new feature developed that passes the unit test and breaks no others.
- A [New Pull Request](#) created with the fix.

This must contains: - A new or modified unit test. - A patch that implements the new feature ensuring all unit tests pass. - The [Change Log](#) updated. - Appropriate documentation updated.

- The [Pull Request](#) is reviewed and approved by at least two other developers.

Writing new Code

- Submit a [New Issue](#)
- Write your code.
- Use [flake8](#) to ensure code quality.
- Run the tests:

```
$ tox
```

- Ensure any new or modified code does not break existing unit tests.
- Update any relevant doc strings or documentation.
- Update the [Change Log](#) updated.
- Submit a [New Pull Request](#).

Running the Tests

To run the tests you will need the following installed:

- `tox` installed as well as
- `pytest-cov`
- `pytest`

All of these can be installed via `pip`.

Please also ensure that you have all supported versions of Python that circuits supports installed in your local environment.

To run the tests:

```
$ tox
```

2.6.5 Development Standards

We use the following development standards:

Cyclomatic Complexity

- Code Complexity shall not exceed 10
See: [Limiting Cyclomatic Complexity](#)

Coding Style

- Code shall conform to the [PEP8](#) Style Guide.

Note: This includes the 79 character limit!

- Doc Strings shall conform to the [PEP257](#) Convention.

Note: Arguments, Keyword Arguments, Return and Exceptions must be documented with the appropriate Sphinx Python Domain <<http://sphinx-doc.org/latest/domains.html#the-python-domain>>‘_’.

Revision History

- Commits shall be small tangible pieces of work. - Each commit must be concise and manageable. - Large changes are to be done over smaller commits.
- There shall be no commit squashing.
- Rebase your changes as often as you can.

Unit Tests

- Every new feature and bug fix must be accompanied with a unit test. (*The only exception to this are minor trivial changes*).

2.7 Change Log

- [#96](#): `circuits.tools.graph()` has been split into smaller functions (for creating *dot*, *ascii*, *png* separately)
- [#132](#): The initial *request* containing the *session* has been added to the websocket dispatcher events in *circuits.web.websockets*
- [#298](#): Added support for Python 3.10
- [#165](#): Fix *Host* HTTP header parsing when *circuits.web.Server* is bound to a *UNIX* Socket
- [#123](#): Fixes bug in the *complete* event
- [#173](#): Fix the type difference between `_current_thread` and `_flushing_thread`
- [#170](#): Fix crash from deleting undefined variables
- [#184](#): Fix websocket data parsing if content is larger than `BUFSIZE`
- [#185](#): Fix Denial of Service socket/memory leak for not connected clients
- [#187](#): Fix parsing and decoding of *application/x-www-urlencoded* payloads
- [#54](#): Fix a memory leak due to *on_done* handlers
- [#202](#): Removed the (unused) internal cache from *EventType*.
- [#198](#): Made pushing onto the event queue via *fire* threadsafe.
- [#235](#): the *prefix* in the *Debugger* might be a *callable* now
- [#241](#): Adjust `circuits.tools.graph()` to API change in *networkx*
- [#254](#): Fix CRLF injection in IRC protocol
- [#257](#): Fix WSGI component for Python 2.7 and Python 3
- [#264](#): Improved robustness of IRC messages
- [#266](#): Fix python2 `str(circuits.core.values.Value())`
- [#269](#): Fix error handling when TLS handshake fails
- [#263](#): Improve error handling during TLS handshake
- [#270](#): fix TLS support for websockets (unhandled `SSLWantReadError`)
- [#176](#): Generator expressions don't raise `StopIteration` anymore
- [#238](#): Reverted changes fixed by upstream *http-parser* library

- : **:security:'251'** A HTTP header injection vulnerability in *circuits.web.websockets.client* has been fixed
- : **:security:'293'** HTML escaping of error responses, 3XX redirects and Powered-by texts has been fixed
- : - typos in docstrings/comments have been fixed
- #252: *circuits.io.serial*: missing encoding parameter has been added
- #253: *circuits.io.serial*: add readline argument to only fire read events for full lines
- #285: requests with chunked transfer encoding are not dispatched if the message body is not yet received completely
- #285: *circuits.web.parsers.http* has been upgraded to latest upstream *http-parser* version
- #238: Reverted changes fixed by upstream *http-parser* library
- : Fixed Python 3 compatibility for *circuits.web.tools.validate_etag()* with MD5 hashes
- #292: HTTP *Connection* header values are now correctly evaluated case insensitive in *web.client* components
- #291: HTTP *Connection* header values are now correctly evaluated case insensitive in *websocket* components
- : **:security:'289'** potential XSS attacks via crafted files in directory listing is now prevented via HTML escaping in the *circuits.web.dispatchers.static* component.
- : **:security:'251'** A HTTP header injection vulnerability in *circuits.web.websockets.client* has been fixed
- : **:security:'293'** HTML escaping of error responses, 3XX redirects and Powered-by texts has been fixed
- : - typos in docstrings/comments have been fixed
- #307: Various format string syntaxes have been relaxed so that they don't cause exceptions on non string input
- #261: A workaround for websocket clients has been added, which prevents that the first websocket is not lost
- #197: Exceptions during *socket.accept()* are now re-raised in the main thread
- #197: Exceptions during initialization of *Poller*'s is now handled via an *'error'* Event
- #168: Add interface for selecting the websocket subprotocol
- #202: Removed *EventType* metaclass
- : Add support to set additional socket options
- #214: Implement *STARTTLS* for sockets as *event*
- #224: Add new HTTP status code *308 moved permanently* (**RFC 7538**)
- #212: Improves the API for session management and adds expire support
- #233: *circuits.core.values.Value* is now *__str__* compatible with Python 2
- #231: Add support for *STOMP* protocol
- #240: Added *auto_add* to *circuits.io.notify*
- #249: Add *irc.utils.irc_color_to_ansi()*
- #245: IRC: enhance stripping of colors
- #273: Added a *bufsize* argument to the *__init__* of *BaseServer*
- : The exception handling has been improved
- #152: Dropped the support for Python 2.6 and $3.x < 3.4$
- : Added support for Python 3.6, 3.7, 3.8, 3.9-dev

- #119: Fixed bug in `circuits.web.url.parse_url()` that caused a display issue with port bindings on ports 80 and 443.
- #115: Fixed `FallbackErrorHandler` API Change
- #113: Fixed bug with forced shutdown of subprocesses in Windows.
- : Bridge: Send exceptions via bridge before change the exceptions weren't propagated via bridge because traceback object is not pickable, now traceback object is replaced by corresponding traceback list
- : Bridge: Do not propagate no results via bridge
- : Fixed issue in bridge with omitting all but the first events sent at once
- : Fixed exception handling in `circuits.web`
- : Fixed import of `FallBackExceptionHandler`
- : Node: Add node examples.
- : Node: fixes event response flood.
- : Node: fixes the event value issue.
- : Node: add event firewall (client / server).
- : Node: add peer node: return channel name.
- : Fixes optional parameters handling (client / server).
- : Rename the `FallbackErrorHandler` to `FallBackExceptionHandler` and the event it listens to to exception
- : Bridge waits for event processing on the other side before proxy handler ends. Now it is possible to collect values from remote handlers in `%_success` event.
- #96: Link to ChangeLog from README
- #117: Fixed inconsistent top-level examples.
- #94: Modified the `circuits.web.Logger` to use the `response_success` event.
- #98: Dockerized circuits. See: <https://docker.io/>
- #99: Added Digest Auth support to the `circuits.web` CLI Tool
- #103: Added the firing of a `disconnect` event for the `WebSocketsDispatcher`.
- #108: Improved server support for the IRC Protocol.
- #112: Improved Signal Handling
- #37: Fixed a typo in *File*
- #38: Guard against invalid headers. (`circuits.web`)
- #46: Set `Content-Type` header on response for errors. (`circuits.web`)
- #48: Allow `event` to be passed to the decorated function (*the request handler*) for `circuits.web`
- #45: Fixed use of `cmp()` and `__cmp__()` for Python 3 compatibility.
- #56: `circuits.web` HEAD request send response body web
- #62: Fix packaging and bump circuits 1.5.1 for @dsuch (*Dariusz Suchojad*) for *Zato*
- #53: `WebSocketClient` treating `WebSocket` data in same TCP segment as HTTP response as part the HTTP response. web
- #67: web example `jsontool` is broken on python3 web

- #77: Uncaught exceptions Event collides with sockets and others core
- #81: “index” method not serving / web
- #76: Missing unit test for DNS lookup failures net
- #66: web examples jsonserializer broken web
- #59: circuits.web DoS in `serve_file` (remote denial of service) web
- #91: Call/Wait and specific instances of events
- #89: Class attributes that reference methods cause duplicate event handlers core
- #47: Dispatcher does not fully respect optional arguments. web
- #97: Fixed `tests.net.test_tcp.test_lookup_failure` test for Windows
- #100: Fixed returned Content-Type in JSON-RPC Dispatcher.
- #102: Fixed minor bug with `WebSocketsDispatcher` causing superfluous `connect()` events from being fired.
- #104: Prevent other websockets sessions from closing.
- #106: Added `__format__` method to `circuits.web.wrappers.HTTPStatus`.
- #107: Added `__le__` and `__ge__` methods to `circuits.web.wrappers.HTTPStatus`
- #109: Fixed `Event.create()` factory and metaclass.
- #111: Fixed broken Digest Auth Test for circuits.web
- #63: typos in documentation docs
- #60: mention `@handler` decorator in tutorial docs
- #65: Update tutorial to match circuits 3.0 API(s) and Semantics docs
- #69: Merge #circuits-dev FreeNode Channel into #circuits
- #75: Document and show examples of using circuits.tools docs
- #70: Convention around method names of event handlers
- #72: Update Event Filtering section of Users Manual docs
- #73: Fix duplication in auto generated API Docs. docs
- #78: Migrate Change Log maintenance and build to Releases
- #71: Document the `value_changed` event docs
- #92: Update circuitsframework.com content docs
- #88: Document the implicit registration of components attached as class attributes docs
- #87: A rendered example of `circuits.tools.graph()`. docs
- #85: Migrate away from ShiningPanda
- #61: circuits.web documentation enhancements docs
- #86: Telnet Tutorial
- #95: Updated Developer Documentation with corrections and a new workflow.

2.7.1 Older Change Logs

For older Change Logs of previous versions of circuits please see the respective [PyPi](#) page(s):

- [circuits-2.1.0](#)
- [circuits-2.0.1](#)
- [circuits-2.0.0](#)
- [circuits-1.6](#)
- [circuits-1.5](#)

2.8 Road Map

We managed our Roadmap on our [\[Github Project\]\(https://github.com/circuits/circuits\)](https://github.com/circuits/circuits)

2.9 Contributors

circuits was originally designed, written and primarily maintained by James Mills (<http://prologic.shortcircuit.net.au/>).

The following users and developers have contributed to circuits:

- Alessio Deiana
- Dariusz Suchojad
- Tim Miller
- Holger Krekel
- Justin Giorgi
- Edwin Marshall
- Alex Mayfield
- Toni Alatalo
- Michael Lipp
- Matthieu Chevrier
- Yoann Ono Dit Biot

Anyone not listed here (*apologies as this list is taken directly from Mercurial's churn command and output*). We appreciate any and all contributions to circuits.

2.10 Frequently Asked Questions

2.10.1 General

... **What is circuits?** circuits is an event-driven framework with a high focus on Component architectures making your life as a software developer much easier. circuits allows you to write maintainable and scalable systems easily

- ... **Can I write networking applications with circuits?** Yes absolutely. circuits comes with socket I/O components for tcp, udp and unix sockets with asynchronous polling implementations for select, poll, epoll and kqueue.
- ... **Can I integrate circuits with a GUI library?** This is entirely possible. You will have to hook into the GUI's main loop.
- ... **What are the core concepts in circuits?** Components and Events. Components are maintainable reusable units of behavior that communicate with other components via a powerful message passing system.
- ... **How would you compare circuits to Twisted?** Others have said that circuits is very elegant in terms of it's usage. circuits' component architecture allows you to define clear interfaces between components while maintaining a high level of scalability and maintainability.
- ... **Can Components communicate with other processes?** Yes. circuits implements currently component bridging and nodes
- ... **What platforms does circuits support?** circuits currently supports Linux, FreeBSD, OSX and Windows and is currently continually tested against Linux against Python versions 2.7, 3.5, 3.6, 3.7, 3.8, 3.9 and 3.10. Windows support is best effort.
- ... **Can circuits be used for concurrent or distributed programming?** Yes. We also have plans to build more distributed components into circuits making distributing computing with circuits very trivial.

Got more questions?

- Send an email to our [Mailing List](#).
- Talk to us online on the [#circuits IRC Channel](#)

2.11 Glossary

VCS Version Control System, what you use for versioning your source code

2.12 Hello

Download Source Code: `hello.py`:

2.13 Echo Server

Download Source Code: `echoserver.py`:

2.14 Hello Web

Download Source Code: `helloweb.py`:

More [examples...](#)

CHAPTER 3

Indices and tables

- Index
- modindex
- search
- *Glossary*

C

- `circuits`, 142
- `circuits.app`, 58
- `circuits.app.daemon`, 55
- `circuits.core`, 72
- `circuits.core.bridge`, 59
- `circuits.core.components`, 59
- `circuits.core.debugger`, 61
- `circuits.core.events`, 61
- `circuits.core.handlers`, 65
- `circuits.core.helpers`, 65
- `circuits.core.loader`, 66
- `circuits.core.manager`, 66
- `circuits.core.pollers`, 69
- `circuits.core.timers`, 70
- `circuits.core.utils`, 71
- `circuits.core.values`, 71
- `circuits.core.workers`, 72
- `circuits.io`, 93
- `circuits.io.events`, 79
- `circuits.io.file`, 92
- `circuits.io.process`, 92
- `circuits.io.serial`, 93
- `circuits.net`, 100
- `circuits.net.events`, 93
- `circuits.net.sockets`, 97
- `circuits.node`, 104
- `circuits.node.client`, 100
- `circuits.node.events`, 101
- `circuits.node.node`, 101
- `circuits.node.server`, 103
- `circuits.node.utils`, 104
- `circuits.protocols`, 108
- `circuits.protocols.http`, 104
- `circuits.protocols.irc`, 106
- `circuits.protocols.line`, 106
- `circuits.protocols.websocket`, 107
- `circuits.six`, 138
- `circuits.tools`, 108
- `circuits.version`, 142
- `circuits.web`, 138
- `circuits.web.client`, 117
- `circuits.web.constants`, 118
- `circuits.web.controllers`, 118
- `circuits.web.dispatchers`, 112
- `circuits.web.dispatchers.dispatcher`, 109
- `circuits.web.dispatchers.jsonrpc`, 109
- `circuits.web.dispatchers.static`, 110
- `circuits.web.dispatchers.virtualhosts`, 110
- `circuits.web.dispatchers.xmlrpc`, 111
- `circuits.web.errors`, 119
- `circuits.web.events`, 120
- `circuits.web.exceptions`, 123
- `circuits.web.headers`, 126
- `circuits.web.http`, 128
- `circuits.web.loggers`, 128
- `circuits.web.main`, 129
- `circuits.web.parsers`, 115
- `circuits.web.parsers.http`, 112
- `circuits.web.parsers.multipart`, 113
- `circuits.web.parsers.querystring`, 115
- `circuits.web.processors`, 129
- `circuits.web.servers`, 130
- `circuits.web.sessions`, 131
- `circuits.web.tools`, 132
- `circuits.web.url`, 134
- `circuits.web.utils`, 135
- `circuits.web.websockets`, 117
- `circuits.web.websockets.client`, 116
- `circuits.web.websockets.dispatcher`, 116
- `circuits.web.wrappers`, 135
- `circuits.web.wsgi`, 137

A

absolute() (*circuits.web.url.URL method*), 134
 abspath() (*circuits.web.url.URL method*), 134
 AbstractBasicAuthHandler (*circuits.six.Module_six_moves_urllib_request attribute*), 139
 AbstractDigestAuthHandler (*circuits.six.Module_six_moves_urllib_request attribute*), 139
 AcceptElement (*class in circuits.web.headers*), 126
 accessed (*class in circuits.io.events*), 79
 add() (*circuits.node.node.Node method*), 102
 add_header() (*circuits.web.headers.Headers method*), 127
 add_metaclass() (*in module circuits.six*), 140
 add_move() (*in module circuits.six*), 141
 addbase (*circuits.six.Module_six_moves_urllib_response attribute*), 140
 addclosehook (*circuits.six.Module_six_moves_urllib_response attribute*), 140
 addHandler() (*circuits.core.Manager method*), 77
 addHandler() (*circuits.core.manager.Manager method*), 67
 addinfo (*circuits.six.Module_six_moves_urllib_response attribute*), 140
 addinfofourl (*circuits.six.Module_six_moves_urllib_response attribute*), 140
 addReader() (*circuits.core.pollers.BasePoller method*), 69
 addReader() (*circuits.core.pollers.EPoll method*), 70
 addReader() (*circuits.core.pollers.KQueue method*), 70
 addReader() (*circuits.core.pollers.Poll method*), 69
 addWriter() (*circuits.core.pollers.BasePoller method*), 69
 addWriter() (*circuits.core.pollers.EPoll method*), 70
 addWriter() (*circuits.core.pollers.KQueue method*), 70
 addWriter() (*circuits.core.pollers.Poll method*), 70

alert_done (*circuits.core.Event attribute*), 75
 alert_done (*circuits.core.events.Event attribute*), 62
 append() (*circuits.web.headers.Headers method*), 128
 append() (*circuits.web.parsers.multipart.MultiDict method*), 114
 Application (*class in circuits.web.wsgi*), 137
 ARRAY (*circuits.web.parsers.querystring.QueryStringToken attribute*), 115
 assertCountEqual() (*in module circuits.six*), 141
 assertRaisesRegex() (*in module circuits.six*), 141
 assertRegex() (*in module circuits.six*), 141
 Authentication (*class in circuits.web.main*), 129
 average() (*in module circuits.web.utils*), 135

B

b() (*in module circuits.six*), 141
 BadGateway, 124
 BadRequest, 124
 base (*circuits.web.http.HTTP attribute*), 128
 BaseComponent (*class in circuits.core*), 73
 BaseComponent (*class in circuits.core.components*), 59
 BaseController (*class in circuits.web.controllers*), 118
 BaseHandler (*circuits.six.Module_six_moves_urllib_request attribute*), 139
 BasePoller (*class in circuits.core.pollers*), 69
 BaseServer (*class in circuits.web.servers*), 130
 basic_auth() (*in module circuits.web.tools*), 132
 body (*circuits.web.wrappers.Response attribute*), 136
 Body (*class in circuits.web.wrappers*), 135
 Bridge (*class in circuits.core*), 76
 Bridge (*class in circuits.core.bridge*), 59
 broadcast (*class in circuits.net.events*), 93
 broadcast() (*circuits.net.sockets.UDPServer method*), 99
 build_opener (*circuits.six.Module_six_moves_urllib_request attribute*), 140
 byte2int() (*in module circuits.six*), 141

C

- CacheFTPHandler (circuits.six.Module_six_moves_urllib_request attribute), 139
- call() (circuits.core.manager.Manager method), 77
- call() (circuits.core.manager.Manager method), 67
- callEvent() (circuits.core.manager.Manager method), 77
- callEvent() (circuits.core.manager.Manager method), 67
- CallValue (class in circuits.core.manager), 66
- cancel() (circuits.core.Event method), 75
- cancel() (circuits.core.events.Event method), 62
- canonical() (circuits.web.url.URL method), 134
- CaseInsensitiveDict (class in circuits.web.headers), 127
- channel (circuits.app.Daemon attribute), 58
- channel (circuits.app.daemon.Daemon attribute), 55
- channel (circuits.core.BaseComponent attribute), 74
- channel (circuits.core.Bridge attribute), 76
- channel (circuits.core.bridge.Bridge attribute), 59
- channel (circuits.core.components.BaseComponent attribute), 60
- channel (circuits.core.loader.Loader attribute), 66
- channel (circuits.core.pollers.BasePoller attribute), 69
- channel (circuits.core.pollers.EPoll attribute), 70
- channel (circuits.core.pollers.KQueue attribute), 70
- channel (circuits.core.pollers.Poll attribute), 70
- channel (circuits.core.pollers.Select attribute), 69
- channel (circuits.core.Worker attribute), 76
- channel (circuits.core.workers.Worker attribute), 72
- channel (circuits.io.file.File attribute), 92
- channel (circuits.io.process.Process attribute), 92
- channel (circuits.io.serial.Serial attribute), 93
- channel (circuits.net.sockets.Client attribute), 97
- channel (circuits.net.sockets.Server attribute), 98
- channel (circuits.node.client.Client attribute), 100
- channel (circuits.node.node.Node attribute), 102
- channel (circuits.node.server.Server attribute), 103
- channel (circuits.protocols.http.HTTP attribute), 104
- channel (circuits.protocols.websocket.WebSocketCodec attribute), 108
- channel (circuits.web.client.Client attribute), 117
- channel (circuits.web.controllers.BaseController attribute), 118
- channel (circuits.web.dispatchers.dispatcher.Dispatcher attribute), 109
- channel (circuits.web.dispatchers.jsonrpc.JSONRPC attribute), 109
- channel (circuits.web.dispatchers.static.Static attribute), 110
- channel (circuits.web.dispatchers.virtualhosts.VirtualHosts attribute), 111
- channel (circuits.web.dispatchers.xmlrpc.XMLRPC attribute), 111
- channel (circuits.web.http.HTTP attribute), 128
- channel (circuits.web.loggers.Logger attribute), 129
- channel (circuits.web.main.Authentication attribute), 129
- channel (circuits.web.main.HelloWorld attribute), 129
- channel (circuits.web.servers.BaseServer attribute), 130
- channel (circuits.web.servers.StdinServer attribute), 131
- channel (circuits.web.sessions.Sessions attribute), 131
- channel (circuits.web.websockets.client.WebSocketClient attribute), 116
- channel (circuits.web.websockets.dispatcher.WebSocketsDispatcher attribute), 117
- channel (circuits.web.wsgi.Application attribute), 137
- channel (circuits.web.wsgi.Gateway attribute), 138
- channels (circuits.core.Event attribute), 75
- channels (circuits.core.events.Event attribute), 62
- check_auth() (in module circuits.web.tools), 132
- child() (circuits.core.Event method), 75
- child() (circuits.core.events.Event method), 62
- chunked (circuits.web.wrappers.Response attribute), 137
- circuits (module), 47, 142
- circuits.app (module), 58
- circuits.app.daemon (module), 55
- circuits.core (module), 72
- circuits.core.bridge (module), 59
- circuits.core.components (module), 24, 59
- circuits.core.debugger (module), 26, 61
- circuits.core.events (module), 61
- circuits.core.handlers (module), 65
- circuits.core.helpers (module), 65
- circuits.core.loader (module), 66
- circuits.core.manager (module), 32, 66
- circuits.core.pollers (module), 69
- circuits.core.timers (module), 70
- circuits.core.utils (module), 71
- circuits.core.values (module), 33, 71
- circuits.core.workers (module), 72
- circuits.io (module), 93
- circuits.io.events (module), 79
- circuits.io.file (module), 92
- circuits.io.process (module), 92
- circuits.io.serial (module), 93
- circuits.net (module), 100
- circuits.net.events (module), 93
- circuits.net.sockets (module), 97
- circuits.node (module), 104
- circuits.node.client (module), 100
- circuits.node.events (module), 101
- circuits.node.node (module), 101
- circuits.node.server (module), 103
- circuits.node.utils (module), 104

circuits.protocols (module), 108
 circuits.protocols.http (module), 104
 circuits.protocols.irc (module), 106
 circuits.protocols.line (module), 106
 circuits.protocols.websocket (module), 107
 circuits.six (module), 138
 circuits.tools (module), 108
 circuits.version (module), 142
 circuits.web (module), 38, 138
 circuits.web.client (module), 117
 circuits.web.constants (module), 118
 circuits.web.controllers (module), 118
 circuits.web.dispatchers (module), 112
 circuits.web.dispatchers.dispatcher (module), 109
 circuits.web.dispatchers.jsonrpc (module), 109
 circuits.web.dispatchers.static (module), 110
 circuits.web.dispatchers.virtualhosts (module), 110
 circuits.web.dispatchers.xmlrpc (module), 111
 circuits.web.errors (module), 119
 circuits.web.events (module), 120
 circuits.web.exceptions (module), 123
 circuits.web.headers (module), 126
 circuits.web.http (module), 128
 circuits.web.loggers (module), 128
 circuits.web.main (module), 129
 circuits.web.parsers (module), 115
 circuits.web.parsers.http (module), 112
 circuits.web.parsers.multipart (module), 113
 circuits.web.parsers.querystring (module), 115
 circuits.web.processors (module), 129
 circuits.web.servers (module), 130
 circuits.web.sessions (module), 131
 circuits.web.tools (module), 132
 circuits.web.url (module), 134
 circuits.web.utils (module), 135
 circuits.web.websockets (module), 117
 circuits.web.websockets.client (module), 116
 circuits.web.websockets.dispatcher (module), 116
 circuits.web.wrappers (module), 135
 circuits.web.wsgi (module), 137
 Client (class in circuits.net.sockets), 97
 Client (class in circuits.node.client), 100
 Client (class in circuits.web.client), 117
 close (circuits.web.wrappers.Response attribute), 137
 close (class in circuits.io.events), 80
 close (class in circuits.net.events), 94
 close () (circuits.io.file.File method), 92
 close () (circuits.io.serial.Serial method), 93
 close () (circuits.net.sockets.Client method), 97
 close () (circuits.net.sockets.Server method), 98
 close () (circuits.net.sockets.UDPServer method), 99
 close () (circuits.node.client.Client method), 100
 close () (circuits.web.client.Client method), 117
 close () (circuits.web.websockets.client.WebSocketClient method), 116
 closed (circuits.io.file.File attribute), 92
 closed (class in circuits.io.events), 81
 closed (class in circuits.net.events), 94
 code (circuits.web.errors.forbidden attribute), 119
 code (circuits.web.errors.httperror attribute), 119
 code (circuits.web.errors.notfound attribute), 119
 code (circuits.web.errors.unauthorized attribute), 119
 code (circuits.web.exceptions.BadGateway attribute), 124
 code (circuits.web.exceptions.BadRequest attribute), 124
 code (circuits.web.exceptions.Forbidden attribute), 126
 code (circuits.web.exceptions.Gone attribute), 125
 code (circuits.web.exceptions.HTTPException attribute), 124
 code (circuits.web.exceptions.InternalServerError attribute), 125
 code (circuits.web.exceptions.LengthRequired attribute), 126
 code (circuits.web.exceptions.MethodNotAllowed attribute), 125
 code (circuits.web.exceptions.NotAcceptable attribute), 124
 code (circuits.web.exceptions.NotFound attribute), 126
 code (circuits.web.exceptions.NotImplemented attribute), 126
 code (circuits.web.exceptions.PreconditionFailed attribute), 125
 code (circuits.web.exceptions.RangeUnsatisfiable attribute), 125
 code (circuits.web.exceptions.Redirect attribute), 123
 code (circuits.web.exceptions.RequestEntityTooLarge attribute), 123
 code (circuits.web.exceptions.RequestTimeout attribute), 123
 code (circuits.web.exceptions.RequestURITooLarge attribute), 124
 code (circuits.web.exceptions.ServiceUnavailable attribute), 123
 code (circuits.web.exceptions.Unauthorized attribute), 125
 code (circuits.web.exceptions.UnsupportedMediaType attribute), 123
 complete (circuits.core.components.prepare_unregister

- attribute*), 60
- complete (circuits.core.Event attribute)*, 75
- complete (circuits.core.events.Event attribute)*, 62
- complete (circuits.web.events.request attribute)*, 120
- complete (circuits.web.events.response attribute)*, 121
- complete (circuits.web.events.stream attribute)*, 122
- Component (class in circuits.core)*, 74
- Component (class in circuits.core.components)*, 60
- compress () (in module circuits.web.utils)*, 135
- connect (class in circuits.net.events)*, 95
- connect () (circuits.net.sockets.TCPClient method)*, 98
- connect () (circuits.net.sockets.UNIXClient method)*, 99
- connect () (circuits.node.client.Client method)*, 100
- connect () (circuits.web.client.Client method)*, 117
- connected (circuits.net.sockets.Client attribute)*, 97
- connected (circuits.net.sockets.Server attribute)*, 98
- connected (circuits.web.client.Client attribute)*, 117
- connected (circuits.web.websockets.client.WebSocketClient attribute)*, 116
- connected (class in circuits.net.events)*, 95
- connected_to (class in circuits.node.events)*, 101
- ContentTooShortError (circuits.six.Module_six_moves_urllib_error attribute)*, 138
- Controller (class in circuits.web.controllers)*, 118
- copy_file () (in module circuits.web.parsers.multipart)*, 115
- create () (circuits.core.Event class method)*, 75
- create () (circuits.core.events.Event class method)*, 62
- create_bound_method () (in module circuits.six)*, 141
- create_environ () (in module circuits.web.wsgi)*, 138
- create_session () (in module circuits.web.sessions)*, 132
- create_unbound_method () (in module circuits.six)*, 141
- created (class in circuits.io.events)*, 81
- D**
 - Daemon (class in circuits.app)*, 58
 - Daemon (class in circuits.app.daemon)*, 55
 - daemonize (class in circuits.app.daemon)*, 55
 - daemonize () (circuits.app.Daemon method)*, 58
 - daemonize () (circuits.app.daemon.Daemon method)*, 55
 - daemonized (class in circuits.app.daemon)*, 56
 - data (circuits.web.sessions.MemoryStore attribute)*, 131
 - Debugger (class in circuits.core)*, 76
 - Debugger (class in circuits.core.debugger)*, 61
 - defrag () (circuits.web.url.URL method)*, 134
 - delete () (circuits.web.sessions.MemoryStore method)*, 131
 - delete () (circuits.web.sessions.Store method)*, 131
 - deleted (class in circuits.io.events)*, 82
 - deletapid (class in circuits.app.daemon)*, 57
 - deletapid () (circuits.app.Daemon method)*, 58
 - deletapid () (circuits.app.daemon.Daemon method)*, 55
 - deparam () (circuits.web.url.URL method)*, 134
 - deprecated () (in module circuits.tools)*, 108
 - description (circuits.web.errors.httperror attribute)*, 119
 - description (circuits.web.exceptions.BadGateway attribute)*, 124
 - description (circuits.web.exceptions.BadRequest attribute)*, 124
 - description (circuits.web.exceptions.Forbidden attribute)*, 126
 - description (circuits.web.exceptions.Gone attribute)*, 125
 - description (circuits.web.exceptions.HTTPException attribute)*, 124
 - description (circuits.web.exceptions.InternalServerError attribute)*, 125
 - description (circuits.web.exceptions.LengthRequired attribute)*, 126
 - description (circuits.web.exceptions.NotAcceptable attribute)*, 124
 - description (circuits.web.exceptions.NotFound attribute)*, 126
 - description (circuits.web.exceptions.NotImplemented attribute)*, 126
 - description (circuits.web.exceptions.PreconditionFailed attribute)*, 125
 - description (circuits.web.exceptions.RangeUnsatisfiable attribute)*, 125
 - description (circuits.web.exceptions.RequestEntityTooLarge attribute)*, 123
 - description (circuits.web.exceptions.RequestTimeout attribute)*, 123
 - description (circuits.web.exceptions.RequestURITooLarge attribute)*, 124
 - description (circuits.web.exceptions.ServiceUnavailable attribute)*, 123
 - description (circuits.web.exceptions.Unauthorized attribute)*, 125
 - description (circuits.web.exceptions.UnsupportedMediaType attribute)*, 123
 - dictform () (in module circuits.web.utils)*, 135
 - digest_auth () (in module circuits.web.tools)*, 133
 - discard () (circuits.core.pollers.BasePoller method)*, 69
 - discard () (circuits.core.pollers.EPoll method)*, 70
 - discard () (circuits.core.pollers.KQueue method)*, 70
 - discard () (circuits.core.pollers.Poll method)*, 70
 - disconnect (class in circuits.net.events)*, 95

disconnected (class in *circuits.net.events*), 95
 disconnected_from (class in *circuits.node.events*), 101
 Dispatcher (class in *circuits.web.dispatchers.dispatcher*), 109
 display_banner (*circuits.web.servers.BaseServer* attribute), 130
 do_handshake() (in module *circuits.net.sockets*), 99
 done (*circuits.web.wrappers.Response* attribute), 137
 drop_privileges() (*circuits.app.DropPrivileges* method), 59
 DropPrivileges (class in *circuits.app*), 59
 dump_event() (in module *circuits.node.utils*), 104
 dump_value() (in module *circuits.node.utils*), 104

E

edges() (in module *circuits.tools*), 108
 elements() (*circuits.web.headers.Headers* method), 128
 encode() (*circuits.web.url.URL* method), 134
 encode_errors (*circuits.web.wrappers.Body* attribute), 135
 eof (class in *circuits.io.events*), 83
 EPoll (class in *circuits.core.pollers*), 70
 equiv() (*circuits.web.url.URL* method), 134
 error (*circuits.six.Module_six_moves_urllib* attribute), 138
 error (class in *circuits.io.events*), 83
 error (class in *circuits.net.events*), 96
 escape() (*circuits.web.url.URL* method), 134
 Event (class in *circuits.core*), 74
 Event (class in *circuits.core.events*), 61
 events() (*circuits.core.BaseComponent* class method), 74
 events() (*circuits.core.components.BaseComponent* class method), 60
 exception (class in *circuits.core.events*), 62
 ExceptionWrapper (class in *circuits.core.manager*), 66
 exec_() (in module *circuits.six*), 141
 execute() (*circuits.web.parsers.http.HttpParser* method), 112
 expire() (*circuits.web.sessions.Session* method), 131
 expired (*circuits.core.manager.Sleep* attribute), 68
 expires() (*circuits.web.controllers.BaseController* method), 118
 expires() (in module *circuits.web.tools*), 133
 expiry (*circuits.core.Timer* attribute), 77
 expiry (*circuits.core.timers.Timer* attribute), 71
 expose() (in module *circuits.web.controllers*), 119
 exposeJSON() (in module *circuits.web.controllers*), 119
 ExposeJSONMetaClass (class in *circuits.web.controllers*), 118

ExposeMetaClass (class in *circuits.web.controllers*), 118
 extract() (*circuits.core.manager.ExceptionWrapper* method), 66

F

failure (*circuits.core.Event* attribute), 75
 failure (*circuits.core.events.Event* attribute), 62
 failure (*circuits.core.task* attribute), 75
 failure (*circuits.core.workers.task* attribute), 72
 failure (*circuits.web.events.request* attribute), 120
 failure (*circuits.web.events.response* attribute), 121
 failure (*circuits.web.events.stream* attribute), 122
 FakeSock (class in *circuits.web.servers*), 130
 FallBackExceptionHandler (class in *circuits.core.helpers*), 65
 FallBackGenerator (class in *circuits.core.helpers*), 66
 FallBackSignalHandler (class in *circuits.core.helpers*), 66
 FancyURLopener (*circuits.six.Module_six_moves_urllib_request* attribute), 139
 feed() (*circuits.web.parsers.multipart.MultipartPart* method), 114
 File (class in *circuits.io.file*), 92
 file_generator() (in module *circuits.web.wrappers*), 137
 FileHandler (*circuits.six.Module_six_moves_urllib_request* attribute), 139
 filename (*circuits.io.file.File* attribute), 92
 find_handlers() (in module *circuits.web.dispatchers.dispatcher*), 109
 findchannel() (in module *circuits.core.utils*), 71
 findcmp() (in module *circuits.core.utils*), 71
 findroot() (in module *circuits.core.utils*), 71
 findroot() (in module *circuits.tools*), 108
 findtype() (in module *circuits.core.utils*), 71
 finish_header() (*circuits.web.parsers.multipart.MultipartPart* method), 114
 fire() (*circuits.core.Manager* method), 78
 fire() (*circuits.core.manager.Manager* method), 67
 fireEvent() (*circuits.core.Manager* method), 78
 fireEvent() (*circuits.core.manager.Manager* method), 67
 flatten() (in module *circuits.core.utils*), 71
 flush() (*circuits.core.Manager* method), 78
 flush() (*circuits.core.manager.Manager* method), 67
 flushEvents() (*circuits.core.Manager* method), 78
 flushEvents() (*circuits.core.manager.Manager* method), 68
 Forbidden, 126
 forbidden (class in *circuits.web.errors*), 119

`forbidden()` (*circuits.web.controllers.BaseController method*), 118
`format` (*circuits.web.loggers.Logger attribute*), 129
`format_traceback()` (*circuits.core.events.exception method*), 62
`formatdate()` (*in module circuits.web.wrappers*), 137
`formattime()` (*in module circuits.web.loggers*), 129
`from_str()` (*circuits.web.headers.AcceptElement class method*), 126
`from_str()` (*circuits.web.headers.HeaderElement class method*), 127
`fromkeys()` (*circuits.web.headers.CaseInsensitiveDict class method*), 127
`FTPHandler` (*circuits.six.Module_six_moves_urllib_request attribute*), 139

G

`Gateway` (*class in circuits.web.wsgi*), 137
`generate_events` (*class in circuits.core.events*), 62
`get()` (*circuits.web.headers.CaseInsensitiveDict method*), 127
`get()` (*circuits.web.parsers.multipart.MultiDict method*), 114
`get()` (*circuits.web.parsers.multipart.MultipartParser method*), 114
`get_all()` (*circuits.web.headers.Headers method*), 128
`get_all()` (*circuits.web.parsers.multipart.MultipartParser method*), 114
`get_connection_names()` (*circuits.node.node.Node method*), 102
`get_headers()` (*circuits.web.parsers.http.HttpParser method*), 112
`get_method()` (*circuits.web.parsers.http.HttpParser method*), 112
`get_path()` (*circuits.web.parsers.http.HttpParser method*), 112
`get_peer()` (*circuits.node.node.Node method*), 103
`get_query_string()` (*circuits.web.parsers.http.HttpParser method*), 112
`get_ranges()` (*in module circuits.web.utils*), 135
`get_scheme()` (*circuits.web.parsers.http.HttpParser method*), 112
`get_socks()` (*circuits.node.server.Server method*), 103
`get_status_code()` (*circuits.web.parsers.http.HttpParser method*), 112
`get_unbound_function()` (*in module circuits.six*), 141
`get_url()` (*circuits.web.parsers.http.HttpParser method*), 112

`get_version()` (*circuits.web.parsers.http.HttpParser method*), 112
`getall()` (*circuits.web.parsers.multipart.MultiDict method*), 114
`getargspec()` (*in module circuits.tools*), 108
`getHandlers()` (*circuits.core.Manager method*), 78
`getHandlers()` (*circuits.core.manager.Manager method*), 68
`getpeername()` (*circuits.web.servers.FakeSock method*), 130
`getproxies` (*circuits.six.Module_six_moves_urllib_request attribute*), 140
`getRequestResponse()` (*circuits.web.wsgi.Application method*), 137
`getTarget()` (*circuits.core.pollers.BasePoller method*), 69
`getValue()` (*circuits.core.values.Value method*), 71
`Gone`, 125
`graph()` (*in module circuits.tools*), 108
`graph_ascii()` (*in module circuits.tools*), 108
`graph_dot()` (*in module circuits.tools*), 108
`graph_png()` (*in module circuits.tools*), 108
`gzip()` (*in module circuits.web.tools*), 133

H

`handled` (*circuits.web.wrappers.Request attribute*), 136
`handler()` (*in module circuits.core*), 72
`handler()` (*in module circuits.core.handlers*), 65
`HandlerMetaClass` (*class in circuits.core.handlers*), 65
`handlers()` (*circuits.core.BaseComponent class method*), 74
`handlers()` (*circuits.core.components.BaseComponent class method*), 60
`handles()` (*circuits.core.BaseComponent class method*), 74
`handles()` (*circuits.core.components.BaseComponent class method*), 60
`header_elements()` (*in module circuits.web.headers*), 128
`header_quote()` (*in module circuits.web.parsers.multipart*), 115
`header_unquote()` (*in module circuits.web.parsers.multipart*), 115
`HeaderElement` (*class in circuits.web.headers*), 127
`headerNames` (*circuits.web.wsgi.Application attribute*), 137
`headers` (*circuits.web.tools.ReverseProxy attribute*), 132
`Headers` (*class in circuits.web.headers*), 127
`hello()` (*circuits.web.main.Root method*), 129
`HelloWorld` (*class in circuits.web.main*), 129
`host` (*circuits.net.sockets.Server attribute*), 98
`host` (*circuits.node.server.Server attribute*), 103

- `host` (*circuits.web.servers.BaseServer* attribute), 130
- `host` (*circuits.web.servers.StdinServer* attribute), 131
- `host` (*circuits.web.wrappers.Request* attribute), 136
- `host` (*circuits.web.wsgi.Application* attribute), 137
- `Host` (class in *circuits.web.wrappers*), 136
- `HTTP` (class in *circuits.protocols.http*), 104
- `HTTP` (class in *circuits.web.http*), 128
- `HTTPBasicAuthHandler` (*circuits.six.Module_six_moves_urllib_request* attribute), 139
- `HTTPCookieProcessor` (*circuits.six.Module_six_moves_urllib_request* attribute), 139
- `HTTPDefaultErrorHandler` (*circuits.six.Module_six_moves_urllib_request* attribute), 139
- `HTTPDigestAuthHandler` (*circuits.six.Module_six_moves_urllib_request* attribute), 139
- `HTTPError` (*circuits.six.Module_six_moves_urllib_error* attribute), 138
- `httperror` (class in *circuits.web.errors*), 119
- `HTTPErrorProcessor` (*circuits.six.Module_six_moves_urllib_request* attribute), 139
- `HTTPException`, 117, 124
- `HTTPHandler` (*circuits.six.Module_six_moves_urllib_request* attribute), 139
- `HttpParser` (class in *circuits.web.parsers.http*), 112
- `HTTPPasswordMgr` (*circuits.six.Module_six_moves_urllib_request* attribute), 140
- `HTTPPasswordMgrWithDefaultRealm` (*circuits.six.Module_six_moves_urllib_request* attribute), 140
- `HTTPRedirectHandler` (*circuits.six.Module_six_moves_urllib_request* attribute), 140
- `HTTPSHandler` (*circuits.six.Module_six_moves_urllib_request* attribute), 140
- `HTTPStatus` (class in *circuits.web.wrappers*), 135
- I**
- `IgnoreChannels` (*circuits.core.Debuger* attribute), 76
- `IgnoreChannels` (*circuits.core.debugger.Debuger* attribute), 61
- `IgnoreEvents` (*circuits.core.Debuger* attribute), 76
- `IgnoreEvents` (*circuits.core.debugger.Debuger* attribute), 61
- `in_subtree()` (*circuits.core.components.prepare_unregister* method), 61
- `index` (*circuits.web.wrappers.Request* attribute), 136
- `indexbytes()` (in module *circuits.six*), 141
- `inform()` (*circuits.core.values.Value* method), 71
- `init()` (*circuits.app.Daemon* method), 58
- `init()` (*circuits.app.daemon.Daemon* method), 55
- `init()` (*circuits.app.DropPrivileges* method), 59
- `init()` (*circuits.core.Bridge* method), 76
- `init()` (*circuits.core.bridge.Bridge* method), 59
- `init()` (*circuits.core.Worker* method), 76
- `init()` (*circuits.core.workers.Worker* method), 72
- `init()` (*circuits.io.file.File* method), 92
- `init()` (*circuits.io.process.Process* method), 92
- `init()` (*circuits.net.sockets.TCPClient* method), 98
- `init()` (*circuits.web.tools.ReverseProxy* method), 132
- `init()` (*circuits.web.wsgi.Application* method), 137
- `init()` (*circuits.web.wsgi.Gateway* method), 138
- `inspect()` (in module *circuits.tools*), 109
- `install_opener` (*circuits.six.Module_six_moves_urllib_request* attribute), 140
- `InternalServerError`, 125
- `InvalidChunkSize`, 113
- `InvalidHeader`, 113
- `InvalidRequestLine`, 113
- `ip` (*circuits.web.wrappers.Host* attribute), 136
- `ipc` (class in *circuits.core*), 76
- `ipc` (class in *circuits.core.bridge*), 59
- `is_buffered()` (*circuits.web.parsers.multipart.MultipartPart* method), 114
- `is_chunked()` (*circuits.web.parsers.http.HttpParser* method), 112
- `is_headers_complete()` (*circuits.web.parsers.http.HttpParser* method), 112
- `is_message_begin()` (*circuits.web.parsers.http.HttpParser* method), 112
- `is_message_complete()` (*circuits.web.parsers.http.HttpParser* method), 112
- `is_partial_body()` (*circuits.web.parsers.http.HttpParser* method), 113
- `is_unix_socket()` (in module *circuits.web.utils*), 135
- `is_upgrade()` (*circuits.web.parsers.http.HttpParser* method), 113
- `isReading()` (*circuits.core.pollers.BasePoller* method), 69
- `isWriting()` (*circuits.core.pollers.BasePoller* method), 69
- `items()` (*circuits.web.headers.Headers* method), 128
- `iterallitems()` (*circuits.web.parsers.multipart.MultiDict* method), 114

`Iterator` (class in `circuits.six`), 138
`iteritems()` (in module `circuits.six`), 141
`iterkeys()` (in module `circuits.six`), 141
`iterlists()` (in module `circuits.six`), 141
`itervalues()` (in module `circuits.six`), 141

J

`join()` (`circuits.core.Manager` method), 78
`join()` (`circuits.core.manager.Manager` method), 68
`JSONController` (class in `circuits.web.controllers`), 118
`JSONRPC` (class in `circuits.web.dispatchers.jsonrpc`), 109

K

`KEY` (`circuits.web.parsers.querystring.QueryStringToken` attribute), 115
`keys()` (`circuits.web.parsers.multipart.MultiDict` method), 114
`kill()` (`circuits.io.process.Process` method), 92
`kill()` (in module `circuits.tools`), 109
`KQueue` (class in `circuits.core.pollers`), 70

L

`LengthRequired`, 126
`Line` (class in `circuits.protocols.line`), 106
`line` (class in `circuits.protocols.line`), 107
`load()` (`circuits.core.loader.Loader` method), 66
`load()` (`circuits.web.sessions.MemoryStore` method), 131
`load()` (`circuits.web.sessions.Store` method), 131
`load_event()` (in module `circuits.node.utils`), 104
`load_value()` (in module `circuits.node.utils`), 104
`Loader` (class in `circuits.core.loader`), 66
`local` (`circuits.web.wrappers.Request` attribute), 136
`lock` (`circuits.core.events.generate_events` attribute), 63
`log()` (`circuits.web.loggers.Logger` method), 129
`log_response()` (`circuits.web.loggers.Logger` method), 129
`Logger` (class in `circuits.web.loggers`), 128
`login` (`circuits.web.wrappers.Request` attribute), 136
`lower()` (`circuits.web.url.URL` method), 134

M

`main()` (in module `circuits.web.main`), 129
`Manager` (class in `circuits.core`), 77
`Manager` (class in `circuits.core.manager`), 66
`MemoryStore` (class in `circuits.web.sessions`), 131
`MethodNotAllowed`, 125
`mode` (`circuits.io.file.File` attribute), 92
`modified` (class in `circuits.io.events`), 84
`Module_six_moves_urllib` (class in `circuits.six`), 138

`Module_six_moves_urllib_error` (class in `circuits.six`), 138
`Module_six_moves_urllib_parse` (class in `circuits.six`), 138
`Module_six_moves_urllib_request` (class in `circuits.six`), 139
`Module_six_moves_urllib_response` (class in `circuits.six`), 140
`Module_six_moves_urllib_robotparser` (class in `circuits.six`), 140
`moved` (class in `circuits.io.events`), 85
`MovedAttribute` (class in `circuits.six`), 140
`MovedModule` (class in `circuits.six`), 140
`MultiDict` (class in `circuits.web.parsers.multipart`), 114
`MultipartError`, 114
`MultipartParser` (class in `circuits.web.parsers.multipart`), 114
`MultipartPart` (class in `circuits.web.parsers.multipart`), 114

N

`name` (`circuits.core.Manager` attribute), 78
`name` (`circuits.core.manager.Manager` attribute), 68
`name` (`circuits.web.exceptions.HTTPException` attribute), 124
`name` (`circuits.web.sessions.Sessions` attribute), 131
`name` (`circuits.web.wrappers.Host` attribute), 136
`next()` (`circuits.six.Iterator` method), 138
`Node` (class in `circuits.node.node`), 101
`NotAcceptable`, 124
`NotConnected`, 117
`NotFound`, 126
`notfound` (class in `circuits.web.errors`), 119
`notfound()` (`circuits.web.controllers.BaseController` method), 118
`notify` (`circuits.core.Event` attribute), 75
`notify` (`circuits.core.events.Event` attribute), 62
`NotImplemented`, 126

O

`OBJECT` (`circuits.web.parsers.querystring.QueryStringToken` attribute), 115
`on_ready()` (`circuits.app.DropPrivileges` method), 59
`on_response()` (`circuits.web.wsgi.Application` method), 137
`on_started()` (`circuits.app.Daemon` method), 58
`on_started()` (`circuits.app.daemon.Daemon` method), 55
`open` (class in `circuits.io.events`), 85
`opened` (class in `circuits.io.events`), 86
`OpenerDirector` (class in `circuits.six.Module_six_moves_urllib_request` attribute), 140

P

- `parent` (*circuits.core.Event* attribute), 75
- `parent` (*circuits.core.events.Event* attribute), 62
- `parse` (*circuits.six.Module_six_moves_urllib* attribute), 138
- `parse()` (*circuits.web.headers.HeaderElement* static method), 127
- `parse()` (*circuits.web.parsers.querystring.QueryStringParser* method), 115
- `parse()` (*circuits.web.url.URL* class method), 134
- `parse_bind()` (in module *circuits.web.main*), 129
- `parse_bind_parameter()` (*circuits.net.sockets.Client* method), 97
- `parse_bind_parameter()` (*circuits.net.sockets.Server* method), 98
- `parse_bind_parameter()` (*circuits.net.sockets.TCP6Client* method), 98
- `parse_bind_parameter()` (*circuits.net.sockets.TCP6Server* method), 98
- `parse_bind_parameter()` (*circuits.net.sockets.TCPServer* method), 99
- `parse_bind_parameter()` (*circuits.net.sockets.UDP6Server* method), 99
- `parse_body()` (in module *circuits.web.utils*), 135
- `parse_form_data()` (in module *circuits.web.parsers.multipart*), 115
- `parse_ipv4_parameter()` (in module *circuits.net.sockets*), 100
- `parse_ipv6_parameter()` (in module *circuits.net.sockets*), 100
- `parse_options()` (in module *circuits.web.main*), 129
- `parse_options_header()` (in module *circuits.web.parsers.multipart*), 115
- `parse_qs` (*circuits.six.Module_six_moves_urllib_parse* attribute), 138
- `parse_qs()` (in module *circuits.web.utils*), 135
- `parse_qs1` (*circuits.six.Module_six_moves_urllib_parse* attribute), 138
- `parse_url()` (in module *circuits.web.client*), 117
- `parse_url()` (in module *circuits.web.url*), 135
- `ParseResult` (*circuits.six.Module_six_moves_urllib_parse* attribute), 138
- `parts()` (*circuits.web.parsers.multipart.MultipartParser* method), 114
- `pathname2url` (*circuits.six.Module_six_moves_urllib_request* attribute), 140
- `pid` (*circuits.core.Manager* attribute), 78
- `pid` (*circuits.core.manager.Manager* attribute), 68
- `Pipe()` (in module *circuits.net.sockets*), 98
- `Poll` (class in *circuits.core.pollers*), 69
- `Poller` (in module *circuits.core.pollers*), 69
- `pop()` (*circuits.web.headers.CaseInsensitiveDict* method), 127
- `port` (*circuits.net.sockets.Server* attribute), 98
- `port` (*circuits.node.server.Server* attribute), 103
- `port` (*circuits.web.servers.BaseServer* attribute), 130
- `port` (*circuits.web.servers.StdinServer* attribute), 131
- `port` (*circuits.web.wrappers.Host* attribute), 136
- `port` (*circuits.web.wsgi.Application* attribute), 137
- `PreconditionFailed`, 125
- `prepare()` (*circuits.web.wrappers.Response* method), 137
- `prepare_unregister` (class in *circuits.core.components*), 60
- `print_()` (in module *circuits.six*), 141
- `Process` (class in *circuits.io.process*), 92
- `process()` (*circuits.web.parsers.querystring.QueryStringParser* method), 115
- `process()` (in module *circuits.web.processors*), 129
- `process_multipart()` (in module *circuits.web.processors*), 129
- `process_urlencoded()` (in module *circuits.web.processors*), 129
- `processTask()` (*circuits.core.Manager* method), 78
- `processTask()` (*circuits.core.manager.Manager* method), 68
- `protocol` (*circuits.web.http.HTTP* attribute), 128
- `protocol` (*circuits.web.wrappers.Request* attribute), 136
- `proxy_bypass` (*circuits.six.Module_six_moves_urllib_request* attribute), 140
- `ProxyBasicAuthHandler` (*circuits.six.Module_six_moves_urllib_request* attribute), 140
- `ProxyDigestAuthHandler` (*circuits.six.Module_six_moves_urllib_request* attribute), 140
- `ProxyHandler` (*circuits.six.Module_six_moves_urllib_request* attribute), 140
- `punycode()` (*circuits.web.url.URL* method), 134
- `python_2_unicode_compatible()` (in module *circuits.six*), 141

Q

- `QueryStringParser` (class in *circuits.web.parsers.querystring*), 115
- `QueryStringToken` (class in *circuits.web.parsers.querystring*), 115
- `quote_plus` (*circuits.six.Module_six_moves_urllib_parse* attribute), 139
- `quote_plus` (*circuits.six.Module_six_moves_urllib_parse* attribute), 139
- `qvalue` (*circuits.web.headers.AcceptElement* attribute), 126

R

- `raise_from()` (in module *circuits.six*), 141
- `RangeUnsatisfiable`, 124

`read` (class in `circuits.io.events`), 87
`read` (class in `circuits.net.events`), 96
`read()` (`circuits.protocols.http.ResponseObject` method), 104
`read()` (`circuits.web.servers.StdinServer` method), 131
`ready` (class in `circuits.io.events`), 87
`ready` (class in `circuits.net.events`), 96
`ready()` (`circuits.net.sockets.UNIXClient` method), 99
`realm` (`circuits.web.main.Authentication` attribute), 129
`reason` (`circuits.web.wrappers.HTTPStatus` attribute), 135
`recv_body()` (`circuits.web.parsers.http.HttpParser` method), 113
`recv_body_into()` (`circuits.web.parsers.http.HttpParser` method), 113
`Redirect`, 123
`redirect` (class in `circuits.web.errors`), 119
`redirect()` (`circuits.web.controllers.BaseController` method), 118
`reduce_time_left()` (`circuits.core.events.generate_events` method), 63
`register()` (`circuits.core.BaseComponent` method), 74
`register()` (`circuits.core.components.BaseComponent` method), 60
`registerChild()` (`circuits.core.Manager` method), 78
`registerChild()` (`circuits.core.manager.Manager` method), 68
`registered` (class in `circuits.core.events`), 63
`registered()` (`circuits.app.Daemon` method), 58
`registered()` (`circuits.app.daemon.Daemon` method), 55
`registerTask()` (`circuits.core.Manager` method), 78
`registerTask()` (`circuits.core.manager.Manager` method), 68
`relative()` (`circuits.web.url.URL` method), 134
`remote` (`circuits.web.wrappers.Request` attribute), 136
`remote` (class in `circuits.node.events`), 101
`remove_move()` (in module `circuits.six`), 141
`removeHandler()` (`circuits.core.Manager` method), 78
`removeHandler()` (`circuits.core.manager.Manager` method), 68
`removeReader()` (`circuits.core.pollers.BasePoller` method), 69
`removeReader()` (`circuits.core.pollers.EPoll` method), 70
`removeReader()` (`circuits.core.pollers.KQueue` method), 70
`removeReader()` (`circuits.core.pollers.Poll` method), 70
`removeWriter()` (`circuits.core.pollers.BasePoller` method), 69
`removeWriter()` (`circuits.core.pollers.EPoll` method), 70
`removeWriter()` (`circuits.core.pollers.KQueue` method), 70
`removeWriter()` (`circuits.core.pollers.Poll` method), 70
`replace()` (`circuits.web.parsers.multipart.MultiDict` method), 114
`reprhandler()` (in module `circuits.core.handlers`), 65
`request` (`circuits.six.Module_six_moves_urllib` attribute), 138
`Request` (`circuits.six.Module_six_moves_urllib_request` attribute), 140
`request` (class in `circuits.protocols.http`), 104
`request` (class in `circuits.web.client`), 117
`request` (class in `circuits.web.events`), 120
`Request` (class in `circuits.web.wrappers`), 136
`request()` (`circuits.web.client.Client` method), 117
`request()` (`circuits.web.main.Authentication` method), 129
`request()` (`circuits.web.main.HelloWorld` method), 129
`request()` (`circuits.web.sessions.Sessions` method), 131
`RequestEntityTooLarge`, 123
`RequestTimeout`, 123
`RequestURITooLarge`, 123
`reraise()` (in module `circuits.six`), 141
`reset()` (`circuits.core.Timer` method), 77
`reset()` (`circuits.core.timers.Timer` method), 71
`resolve_methods()` (in module `circuits.web.dispatchers.dispatcher`), 109
`resolve_path()` (in module `circuits.web.dispatchers.dispatcher`), 109
`response` (`circuits.six.Module_six_moves_urllib` attribute), 138
`response` (`circuits.web.client.Client` attribute), 117
`response` (class in `circuits.protocols.http`), 105
`response` (class in `circuits.web.events`), 120
`Response` (class in `circuits.web.wrappers`), 136
`ResponseObject` (class in `circuits.protocols.http`), 104
`resume()` (`circuits.core.helpers.FallBackGenerator` method), 66
`resume()` (`circuits.core.pollers.BasePoller` method), 69
`ReverseProxy` (class in `circuits.web.tools`), 132
`RFC`
 RFC 7538, 148
`RobotFileParser` (`circuits.six.Module_six_moves_urllib_robotparser` attribute), 140
`robotparser` (`circuits.six.Module_six_moves_urllib`

- attribute), 138
- Root (class in *circuits.web.main*), 129
- rpc (class in *circuits.web.dispatchers.jsonrpc*), 109
- rpc (class in *circuits.web.dispatchers.xmlrpc*), 111
- run() (*circuits.core.Manager* method), 78
- run() (*circuits.core.manager.Manager* method), 68
- running (*circuits.core.Manager* attribute), 78
- running (*circuits.core.manager.Manager* attribute), 68
- ## S
- safeimport() (in module *circuits.core.utils*), 71
- sanitize() (*circuits.web.errors.httperror* method), 119
- sanitize() (*circuits.web.url.URL* method), 134
- save() (*circuits.web.sessions.MemoryStore* method), 131
- save() (*circuits.web.sessions.Store* method), 131
- save_as() (*circuits.web.parsers.multipart.MultipartPart* method), 114
- scheme (*circuits.web.http.HTTP* attribute), 128
- scheme (*circuits.web.wrappers.Request* attribute), 136
- script_name (*circuits.web.wrappers.Request* attribute), 136
- secure (*circuits.web.servers.BaseServer* attribute), 130
- secure (*circuits.web.servers.StdinServer* attribute), 131
- secure (*circuits.web.wsgi.Application* attribute), 137
- seek (class in *circuits.io.events*), 88
- seek() (*circuits.io.file.File* method), 92
- Select (class in *circuits.core.pollers*), 69
- select_poller() (in module *circuits.web.main*), 129
- select_subprotocol() (*circuits.web.websockets.dispatcher.WebSocketsDispatcher* method), 117
- send() (*circuits.node.client.Client* method), 100
- send() (*circuits.node.server.Server* method), 103
- send_all() (*circuits.node.server.Server* method), 104
- send_to() (*circuits.node.server.Server* method), 104
- Serial (class in *circuits.io.serial*), 93
- serve_download() (*circuits.web.controllers.BaseController* method), 118
- serve_download() (in module *circuits.web.tools*), 133
- serve_file() (*circuits.web.controllers.BaseController* method), 118
- serve_file() (in module *circuits.web.tools*), 133
- server (*circuits.web.wrappers.Request* attribute), 136
- Server (class in *circuits.net.sockets*), 98
- Server (class in *circuits.node.server*), 103
- Server (class in *circuits.web.servers*), 130
- ServiceUnavailable, 123
- Session (class in *circuits.web.sessions*), 131
- Sessions (class in *circuits.web.sessions*), 131
- setDefault() (*circuits.web.headers.CaseInsensitiveDict* method), 127
- setValue() (*circuits.core.values.Value* method), 71
- should_keep_alive() (*circuits.web.parsers.http.HttpParser* method), 113
- sid (*circuits.web.sessions.Session* attribute), 131
- signal (class in *circuits.core.events*), 63
- signal() (*circuits.io.process.Process* method), 92
- Sleep (class in *circuits.core.manager*), 68
- sleep() (in module *circuits.core.manager*), 69
- socket_family (*circuits.net.sockets.Client* attribute), 97
- socket_family (*circuits.net.sockets.TCP6Client* attribute), 98
- socket_family (*circuits.net.sockets.TCP6Server* attribute), 98
- socket_family (*circuits.net.sockets.TCPClient* attribute), 98
- socket_family (*circuits.net.sockets.TCPServer* attribute), 99
- socket_family (*circuits.net.sockets.UDP6Server* attribute), 99
- socket_family (*circuits.net.sockets.UDPServer* attribute), 99
- socket_family (*circuits.net.sockets.UNIXClient* attribute), 99
- socket_family (*circuits.net.sockets.UNIXServer* attribute), 99
- socket_options (*circuits.net.sockets.Client* attribute), 98
- socket_options (*circuits.net.sockets.TCPClient* attribute), 98
- socket_options (*circuits.net.sockets.TCPServer* attribute), 99
- socket_options (*circuits.net.sockets.UDPServer* attribute), 99
- socket_options (*circuits.net.sockets.UNIXClient* attribute), 99
- socket_options (*circuits.net.sockets.UNIXServer* attribute), 99
- socket_protocol (*circuits.net.sockets.Client* attribute), 98
- socket_protocol (*circuits.net.sockets.Server* attribute), 98
- socket_protocol (*circuits.net.sockets.TCPClient* attribute), 98
- socket_type (*circuits.net.sockets.Client* attribute), 98
- socket_type (*circuits.net.sockets.TCPClient* attribute), 98
- socket_type (*circuits.net.sockets.TCPServer* attribute), 99
- socket_type (*circuits.net.sockets.UDPServer* attribute), 99

- socket_type (circuits.net.sockets.UNIXClient attribute), 99
- socket_type (circuits.net.sockets.UNIXServer attribute), 99
- splitLines() (in module circuits.protocols.line), 107
- splitquery (circuits.six.Module_six_moves_urllib_parse attribute), 139
- SplitResult (circuits.six.Module_six_moves_urllib_parse attribute), 138
- splittag (circuits.six.Module_six_moves_urllib_parse attribute), 139
- splituser (circuits.six.Module_six_moves_urllib_parse attribute), 139
- splitvalue (circuits.six.Module_six_moves_urllib_parse attribute), 139
- start() (circuits.core.Manager method), 78
- start() (circuits.core.manager.Manager method), 68
- start() (circuits.io.process.Process method), 92
- started (class in circuits.core.events), 63
- started (class in circuits.io.events), 89
- starttls (class in circuits.net.events), 96
- starttls() (circuits.net.sockets.Server method), 98
- Static (class in circuits.web.dispatchers.static), 110
- status (circuits.io.process.Process attribute), 92
- status (circuits.web.wrappers.HTTPStatus attribute), 136
- status (circuits.web.wrappers.Response attribute), 137
- Status (class in circuits.web.wrappers), 137
- stddev() (in module circuits.web.utils), 135
- StdinServer (class in circuits.web.servers), 130
- stop() (circuits.core.Event method), 75
- stop() (circuits.core.events.Event method), 62
- stop() (circuits.core.Manager method), 79
- stop() (circuits.core.manager.Manager method), 68
- stop() (circuits.io.process.Process method), 92
- stopped (class in circuits.core.events), 64
- stopped (class in circuits.io.events), 89
- store (circuits.web.sessions.Session attribute), 131
- store (circuits.web.sessions.Sessions attribute), 131
- Store (class in circuits.web.sessions), 131
- stream (circuits.web.wrappers.Response attribute), 137
- stream (class in circuits.web.events), 121
- success (circuits.core.Event attribute), 75
- success (circuits.core.events.Event attribute), 62
- success (circuits.core.task attribute), 75
- success (circuits.core.workers.task attribute), 72
- success (circuits.web.events.request attribute), 120
- success (circuits.web.events.response attribute), 121
- success (circuits.web.events.stream attribute), 122
- T**
- task (circuits.core.manager.Sleep attribute), 69
- task (class in circuits.core), 75
- task (class in circuits.core.workers), 72
- TCP6Client (class in circuits.net.sockets), 98
- TCP6Server (class in circuits.net.sockets), 98
- TCPCClient (class in circuits.net.sockets), 98
- TCPServer (class in circuits.net.sockets), 98
- terminate (class in circuits.web.events), 122
- terminated (class in circuits.io.process), 93
- tick() (circuits.core.Manager method), 79
- tick() (circuits.core.manager.Manager method), 68
- time_left (circuits.core.events.generate_events attribute), 63
- TimeoutError, 69, 79
- Timer (class in circuits.core), 76
- Timer (class in circuits.core.timers), 70
- to_b() (in module circuits.web.parsers.multipart), 115
- tokens() (circuits.web.parsers.querystring.QueryStringParser method), 115
- traceback (circuits.web.exceptions.HTTPException attribute), 124
- translateHeaders() (circuits.web.wsgi.Application method), 137
- tryimport() (in module circuits.tools), 109
- U**
- u() (in module circuits.six), 141
- UDP6Client (in module circuits.net.sockets), 99
- UDP6Server (class in circuits.net.sockets), 99
- UDPCClient (in module circuits.net.sockets), 99
- UDPServer (class in circuits.net.sockets), 99
- Unauthorized, 125
- unauthorized (class in circuits.web.errors), 119
- unescape() (circuits.web.url.URL method), 134
- unicode() (circuits.web.url.URL method), 134
- UnicodeError, 124
- UNIXClient (class in circuits.net.sockets), 99
- UNIXServer (class in circuits.net.sockets), 99
- Unknown (class in circuits.core.handlers), 65
- UnknownHandler (circuits.six.Module_six_moves_urllib_request attribute), 140
- unmounted (class in circuits.io.events), 90
- unpunycode() (circuits.web.url.URL method), 135
- unquote (circuits.six.Module_six_moves_urllib_parse attribute), 139
- unquote_plus (circuits.six.Module_six_moves_urllib_parse attribute), 139
- unreachable (class in circuits.net.events), 97
- unregister() (circuits.core.BaseComponent method), 74
- unregister() (circuits.core.components.BaseComponent method), 60
- unregister_pending (circuits.core.BaseComponent attribute), 74
- unregister_pending (circuits.core.components.BaseComponent attribute), 60

- tribute*), 60
 - `unregisterChild()` (*circuits.core.Manager method*), 79
 - `unregisterChild()` (*circuits.core.manager.Manager method*), 68
 - `unregistered` (*class in circuits.core.events*), 64
 - `unregisterTask()` (*circuits.core.Manager method*), 79
 - `unregisterTask()` (*circuits.core.manager.Manager method*), 68
 - `UnregistrableError`, 69
 - `UnsupportedMediaType`, 123
 - `update()` (*circuits.web.headers.CaseInsensitiveDict method*), 127
 - `uri` (*circuits.web.controllers.BaseController attribute*), 118
 - `uri` (*circuits.web.http.HTTP attribute*), 128
 - `URL` (*class in circuits.web.url*), 134
 - `url2pathname` (*circuits.six.Module_six_moves_urllib_request attribute*), 140
 - `urlcleanup` (*circuits.six.Module_six_moves_urllib_request attribute*), 140
 - `urldefrag` (*circuits.six.Module_six_moves_urllib_parse attribute*), 139
 - `urlencode` (*circuits.six.Module_six_moves_urllib_parse attribute*), 139
 - `URLError` (*circuits.six.Module_six_moves_urllib_error attribute*), 138
 - `urljoin` (*circuits.six.Module_six_moves_urllib_parse attribute*), 139
 - `urlopen` (*circuits.six.Module_six_moves_urllib_request attribute*), 140
 - `URLOpener` (*circuits.six.Module_six_moves_urllib_request attribute*), 140
 - `urlparse` (*circuits.six.Module_six_moves_urllib_parse attribute*), 139
 - `urlretrieve` (*circuits.six.Module_six_moves_urllib_request attribute*), 140
 - `urlsplit` (*circuits.six.Module_six_moves_urllib_parse attribute*), 139
 - `urlunparse` (*circuits.six.Module_six_moves_urllib_parse attribute*), 139
 - `urlunsplit` (*circuits.six.Module_six_moves_urllib_parse attribute*), 139
 - `users` (*circuits.web.main.Authentication attribute*), 129
 - `uses_fragment` (*circuits.six.Module_six_moves_urllib_parse attribute*), 139
 - `uses_netloc` (*circuits.six.Module_six_moves_urllib_parse attribute*), 139
 - `uses_params` (*circuits.six.Module_six_moves_urllib_parse attribute*), 139
 - `uses_query` (*circuits.six.Module_six_moves_urllib_parse attribute*), 139
 - `uses_relative` (*circuits.six.Module_six_moves_urllib_parse attribute*), 139
 - `utf8()` (*circuits.web.url.URL method*), 135
- ## V
- `validate_etags()` (*in module circuits.web.tools*), 133
 - `validate_since()` (*in module circuits.web.tools*), 134
 - `value` (*circuits.core.values.Value attribute*), 71
 - `value` (*circuits.web.parsers.multipart.MultipartPart attribute*), 114
 - `Value` (*class in circuits.core.values*), 71
 - `variance()` (*in module circuits.web.utils*), 135
 - `VCS`, 152
 - `verify_session()` (*in module circuits.web.sessions*), 132
 - `version` (*circuits.web.http.HTTP attribute*), 128
 - `VirtualHosts` (*class in circuits.web.dispatchers.virtualhosts*), 111
- ## W
- `wait()` (*circuits.core.Manager method*), 79
 - `wait()` (*circuits.core.manager.Manager method*), 68
 - `wait()` (*circuits.io.process.Process method*), 92
 - `waitEvent()` (*circuits.core.Manager method*), 79
 - `waitEvent()` (*circuits.core.manager.Manager method*), 68
 - `waitingHandlers` (*circuits.core.Event attribute*), 75
 - `waitingHandlers` (*circuits.core.events.Event attribute*), 62
 - `walk()` (*in module circuits.tools*), 109
 - `WebSocketClient` (*class in circuits.web.websockets.client*), 116
 - `WebSocketCodec` (*class in circuits.protocols.websocket*), 107
 - `WebSocketsDispatcher` (*class in circuits.web.websockets.dispatcher*), 116
 - `who()` (*in module circuits.web.sessions*), 132
 - `with_metaclass()` (*in module circuits.six*), 141
 - `Worker` (*class in circuits.core*), 75
 - `Worker` (*class in circuits.core.workers*), 72
 - `wraps()` (*in module circuits.six*), 141
 - `write` (*class in circuits.io.events*), 91
 - `write` (*class in circuits.net.events*), 97
 - `write()` (*circuits.io.file.File method*), 92
 - `write()` (*circuits.io.process.Process method*), 92
 - `write()` (*circuits.io.serial.Serial method*), 93
 - `write()` (*circuits.net.sockets.Client method*), 98
 - `write()` (*circuits.net.sockets.Server method*), 98
 - `write()` (*circuits.net.sockets.UDPServer method*), 99
 - `write()` (*circuits.web.client.Client method*), 117

`write()` (*circuits.web.servers.StdinServer* method),
131
`write_body()` (*circuits.web.parsers.multipart.MultipartPart*
method), 115
`write_header()` (*circuits.web.parsers.multipart.MultipartPart*
method), 115
`writepid` (*class in circuits.app.daemon*), 57
`writepid()` (*circuits.app.Daemon* method), 58
`writepid()` (*circuits.app.daemon.Daemon* method),
55

X

`XMLRPC` (*class in circuits.web.dispatchers.xmlrpc*), 111