Web Applications, Continuations, & Seaside

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CS 510 Advanced Programming

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- Desktop applications ask the user questions
- Web apps put the web browser in charge

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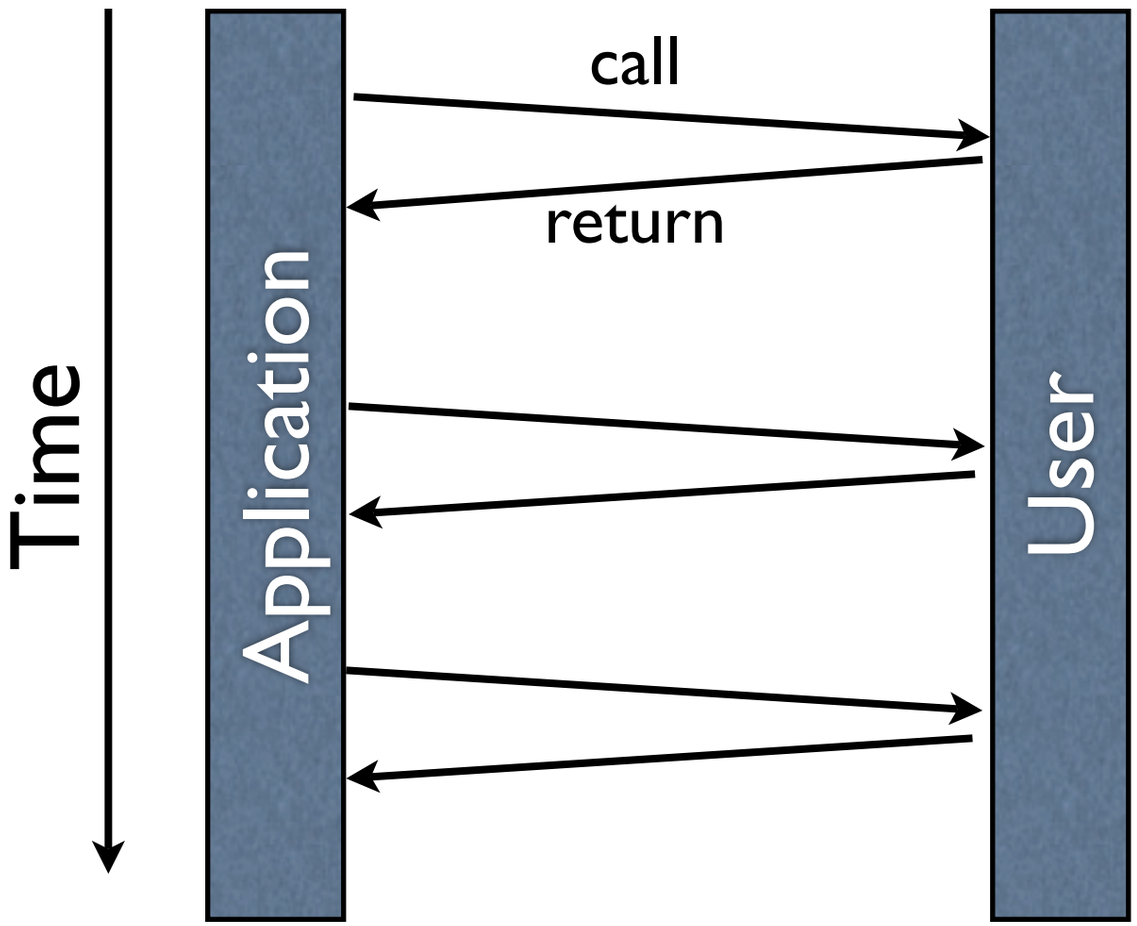

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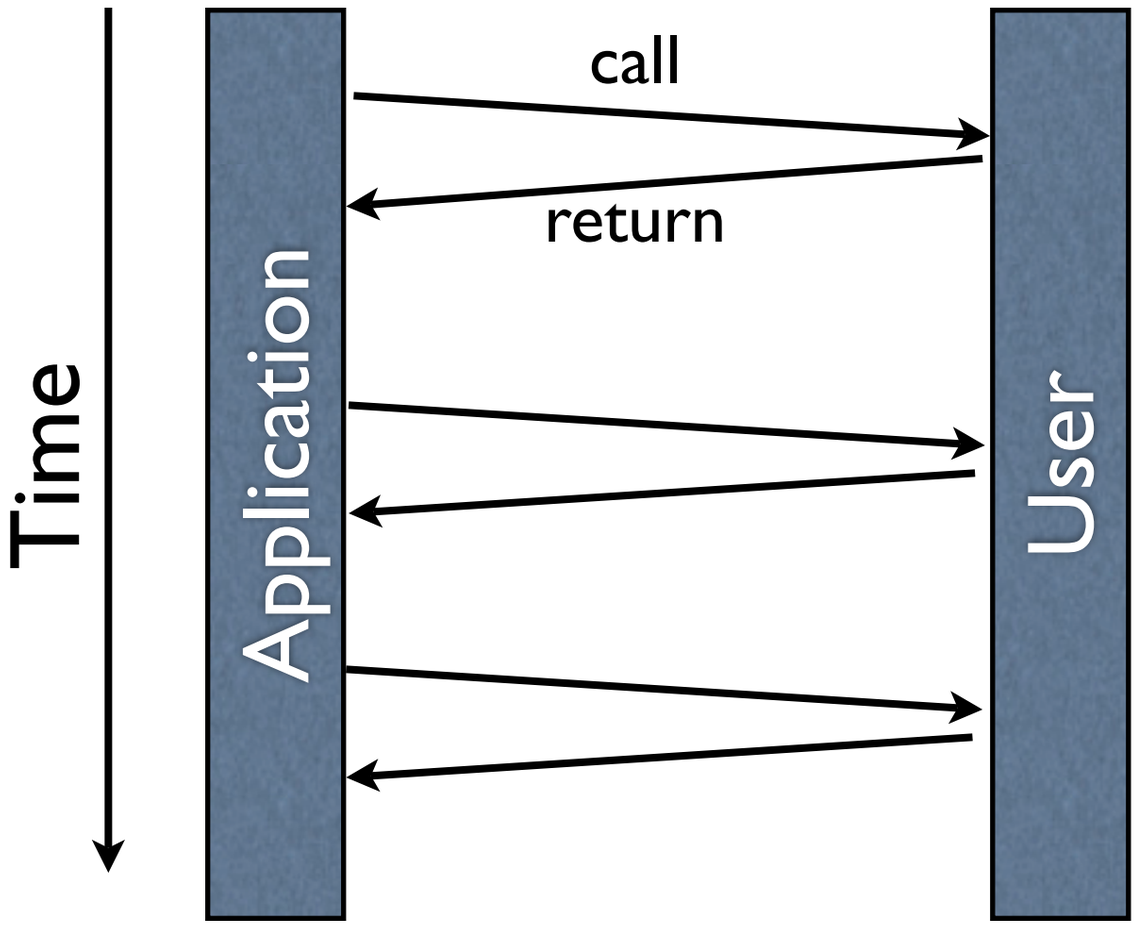

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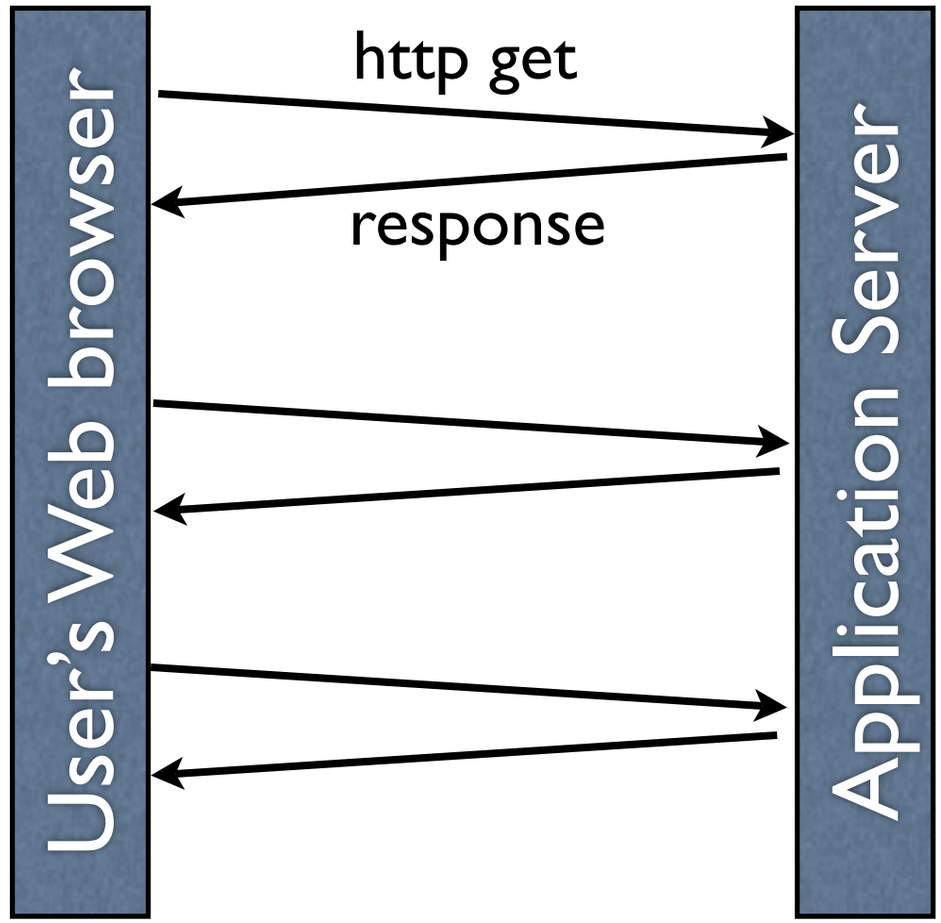

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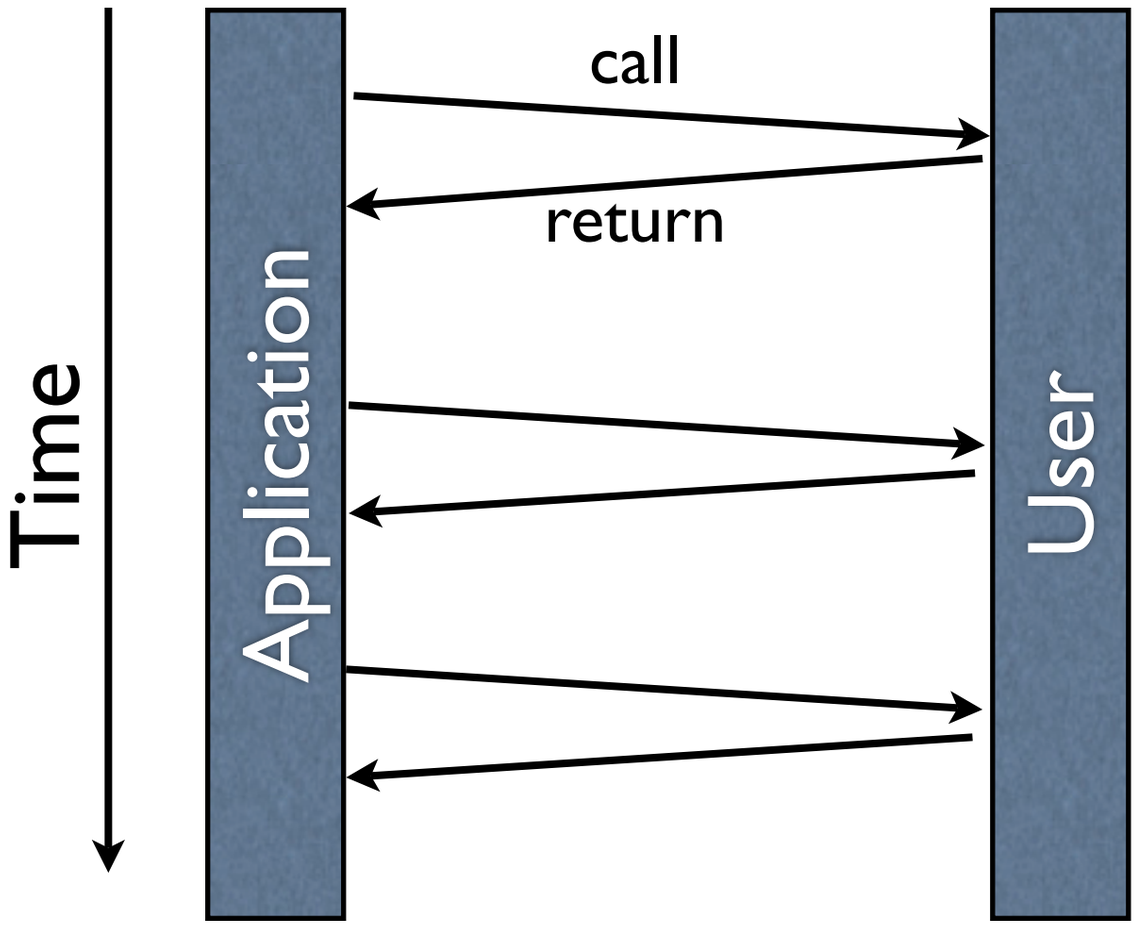

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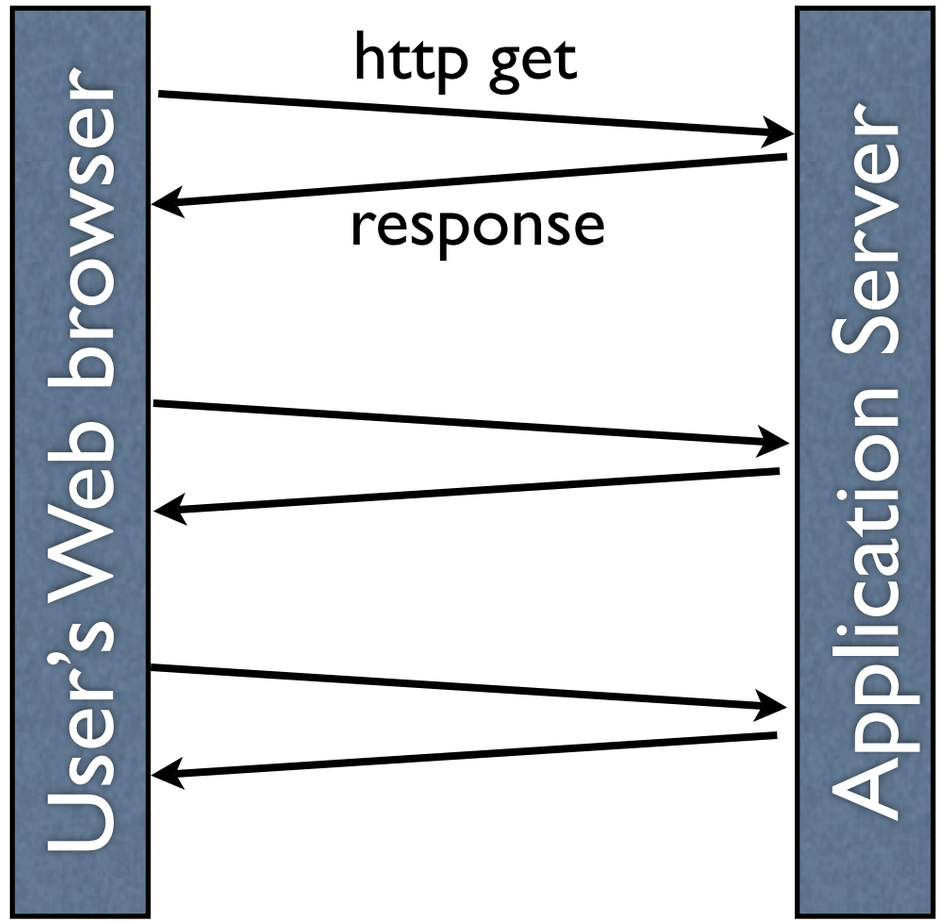
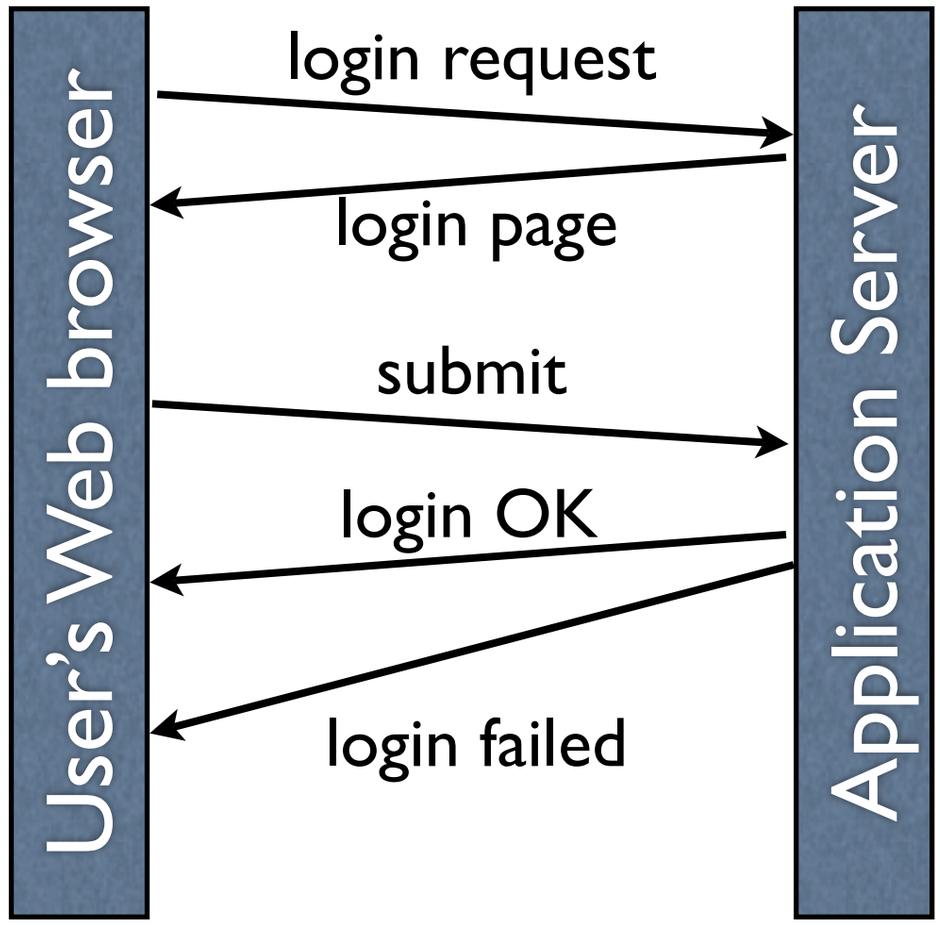


No shared state

Consider “logging in”

- “log in” button creates a new *Login* web page asking for user name and password.
- “submit” button on the *Login* page passes the results of the fields to a validation routine, which determines if login is successful.
- One of two response pages must be generated and displayed.



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- Seaside lets you write more or less the same thing in a web application:

```
| user |
user := self call: AuthenticationComponent new.
user username = ''
  ifFalse:  [ self inform: 'Login successful ', user username]
  ifTrue: [ self inform: 'Login failed' ]
```

- AuthenticationComponent is also straightforward:

```
AuthenticationComponent >> renderContentOn: html
  | user |
  user := AuthUser new.
  html form: [
    html paragraph with: [
      html span with: 'Username'.
      html textInput on: #username of: user.
      ].
    html paragraph with: [
      html span with: 'Password'.
      html textInput on: #password of: user.
      ].
    html submitButton callback: [ self answer: user ].
    ].
```

How does this work?

- The keys are the call: and answer: messages, which save and resume a computation.
- They are implemented using *continuations*

Continuations in Smalltalk

- Continuations are not “built in” to Smalltalk
  - but Smalltalk has enough reflective capability to build continuations into a library

- **thisContext** is the sixth keyword in Smalltalk
  - What are the other five?
  - **thisContext** answers the current execution context, usually a MethodContext or a BlockContext.

uses of **thisContext**

- Most obvious use is in the debugger:
  - the context objects make up the stack
  - each Context object is linked to the previous one using the sender instance variable
- thisContext can also be used to implement Continutaions

Class Continuation

- let’s look at the implementation
- let’s try some examples using continuations

Seaside

- Presentation based on a chapter from the as-yet-unpublished volume 2 of “Squeak by Example” (on class web page)

How to get Seaside

- The Seaside “one click experience”
  - available from http://www.seaside.st
  - designed for people who don’t already know how to run Squeak.
  - Multi-platform
  - All *you* really need is the Seaside image

In the Seaside image…

- There is a web server
  - you have to start it!
    - WAKom startOn: 8080.
  - and eventually, stop it
    - WAKom stop.
- Then, point your web browser at it:
  - http://localhost:8080/seaside

Components

- Seaside web pages are built from Components
  - subinstances of WAComponent
- Similar to on-screen GUIs
  - built from subinstances of Morph
- Each Component is responsible for rendering itself onto an HTML “canvass”
  - has application-specific state in its instance vars

Components

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  - a component can be instantiated many times, in different contexts
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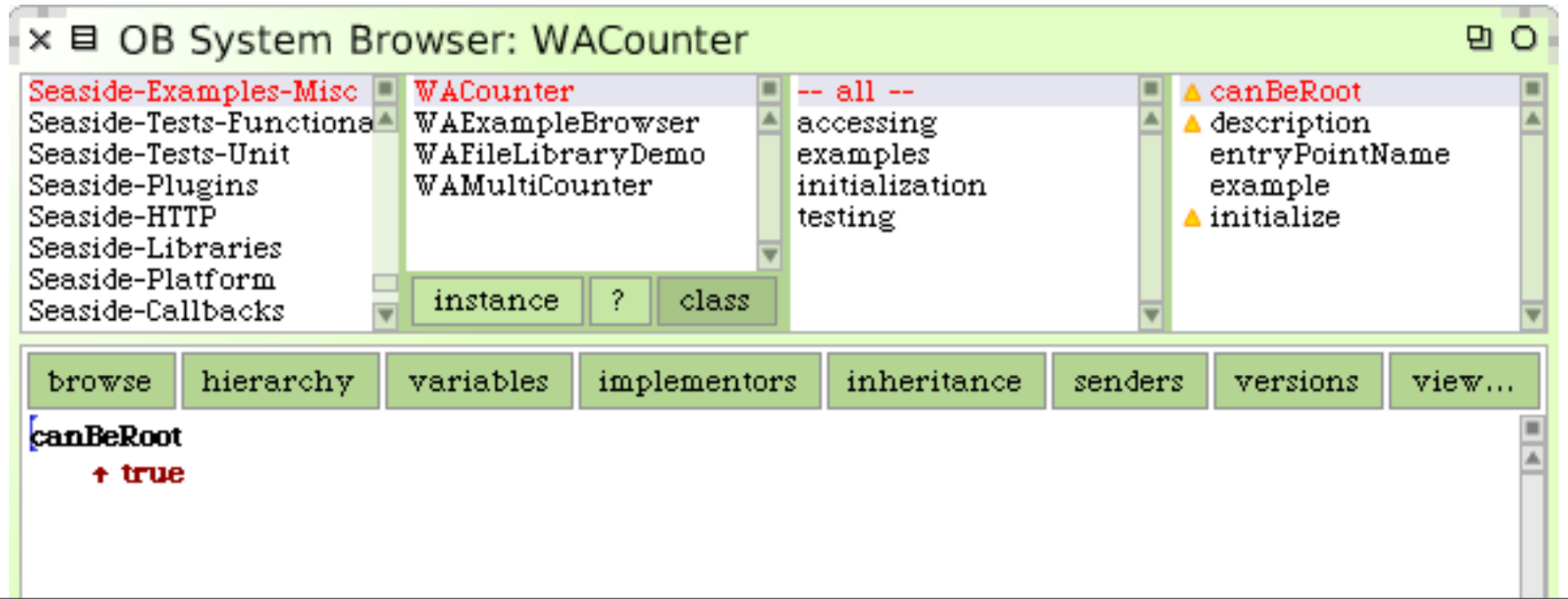

Examples Directory

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- Counter
- Config page
- MultiCounter

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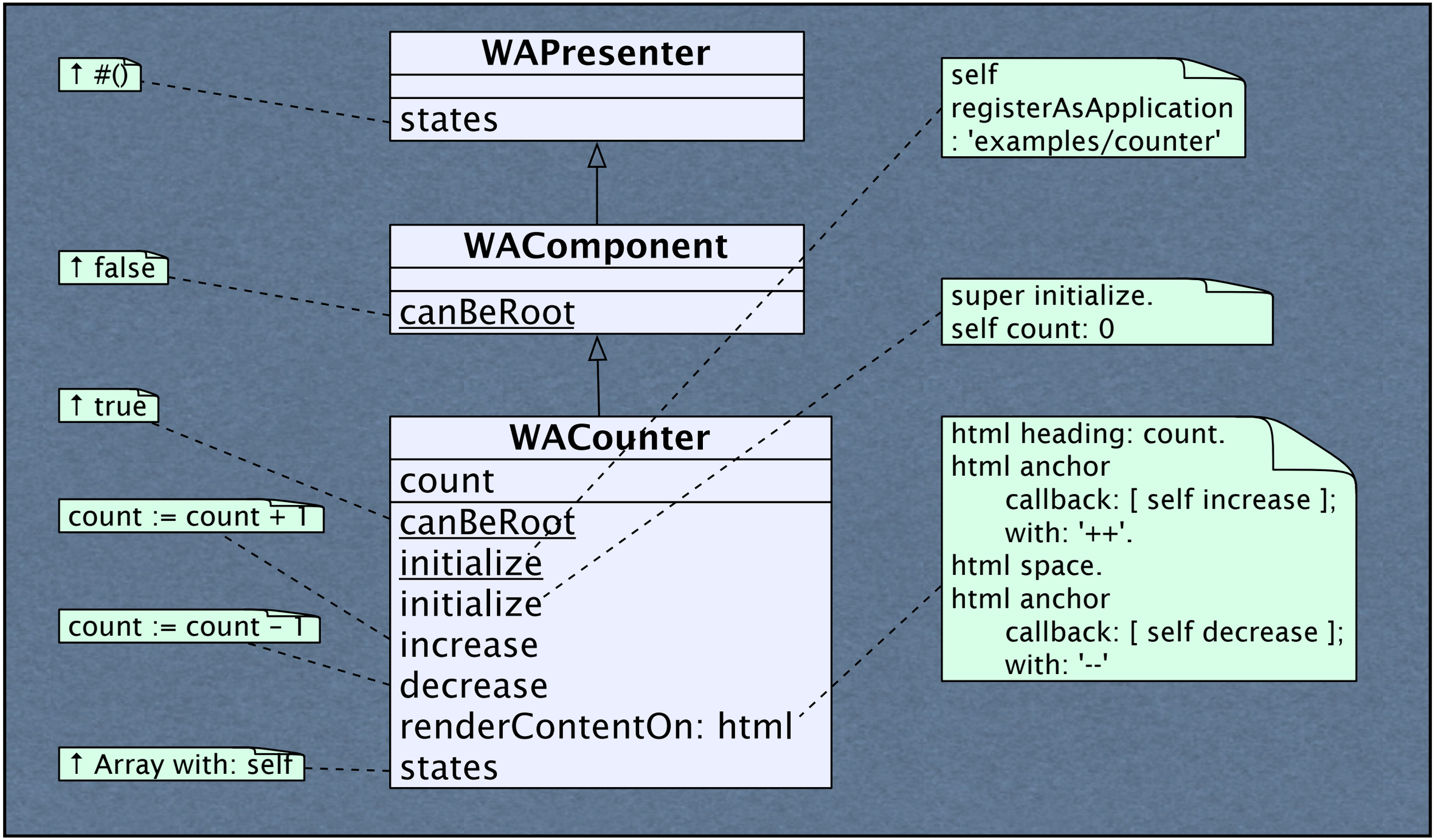


Cleint-side Editing

- Toggle Halos gives access to
  - class browser
  - object inspector
  - CSS Style editor

“Hello World” in Seaside

- Define a subclass of WAComponent called WAHelloWorld.
- Implement the renderContentOn: method
  - WAHelloWorld»**renderContentOn:** html
    html text: 'hello world'
- Tell Seaside that WAHelloWorld is an “application”
  - WAHelloWorld class»**canBeRoot**
    ↑ true
- Configure seaside to launch the application
  - Point the browser to http:// localhost:8080/seaside/config

Backtracking

- When we went back to an earlier counter, the state of the counter was correctly backtracked
  - What makes this happen?
- Each component is sent the message states: it answers the objects that should be (shallow) copied into a WASnapshot
  - WACounter››states answers {self}

Rendering

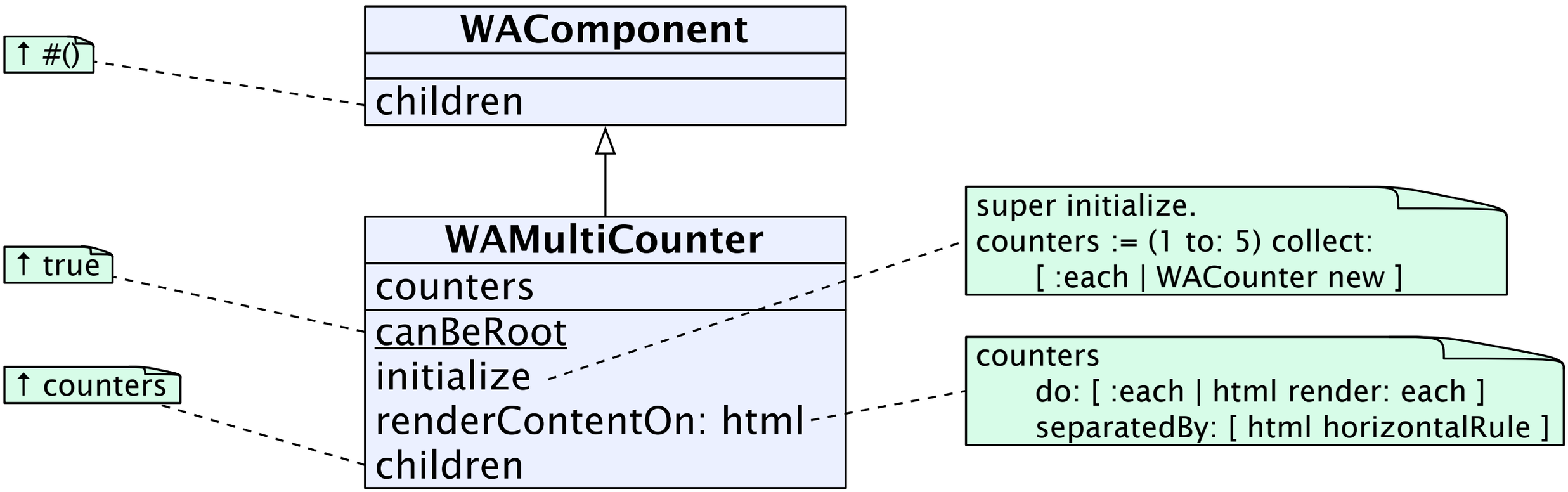
- Rendering html is a bit like drawing onto a graphics canvas:
  - each component is responsible for drawing itself
  - the Seaside framework starts the process by creating the html canvas and asking the top-level component to draw itself

Rendering the counter

```
renderContentOn: html
        html heading: count.
        html anchor
            callback: [ self increase ];
            with: '++'.
    html space.
    html anchor
        callback: [ self decrease ];
        with: '--'
```

Multicounter

- WAMulticounter has WACounters as components



WACanvas

- the “html” argument to a rendering method is a WARenderCanvas
  - it provides “brushes” for many html markups