Go at Canonical

Transitioning Juju to Go

Presentation by
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About this talk

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About Me

- Contributor to Go since 2011
- Work with agl on the ssh package
- Work with minux.ma on all things ARM
- Run the arm5 builder
- Joined Canonical in May 2012 to work on Juju

About Juju

- Service orchestration platform
- Juju describes *services* and their *relationships*
- A framework for developers and system administrators to deploy *services* via *charms*
- *Charms* encapsulate the logic required to build, maintain, upgrade and decommission a *service*
- *Relationships* between *services* allow *charms* to programmatically configure themselves by invoking *hooks*
- Juju manages the provisioning of *services* on virtual (or physical) infrastructure

What are the components of Juju

- Centralised state repository
- A provisioning agent, which interfaces with the infrastructure provider to spin up new machines when required
- One machine agent per machine, which handles starting unit agents
- One unit agent per service instance, which is responsible for running the Charm hooks
- Command line tools
- Command line utilities
- Charms

Why the transition to Go

- Juju has been shipping since Ubuntu 11.10
- Juju is a supported part of Ubuntu 12.04LTS.
- Python code uses Twisted, Python generators and callbacks heavily
- Quite hard to get right, hard to reason about
- Heavily asynchronous, hard to know when an action will occur, hard to know if an action has occurred

Why the transition to Go pt. 2

- The watcher pattern is a natural fit for channels
- Synchronous coding as an alternative to callbacks
- Static typing reduces the amount of test logic required for verification
- Go binaries have a lower resource footprint
- Go is supported on ARM
- Canonical is interested in Go, Juju is a the first of many projects

How we develop Juju in Go

- Team of seven, including a manager
- Very geographically dispersed
- Use Launchpad for project management
- IRC and mailing lists for communication
- Weekly meeting held on G+ hangout
- Occasional week long sprints

How we develop Juju in Go, pt 2

- Use Rietveld for code review via lbox
- Custom bzr wrapper, cobzr, for branch management
- Additional packages written by the team, goamz, gnuflag, goyaml, gozk
- Variety of editors; Vim, acme, Sublime text all represented
- Various $GOPATH strategies

Testing

- Use gocheck heavily
- Lots of table driven tests
- Embedding allows us to compose test suites with complex seutp and tear down phases
- jujutest package runs the same integration tests against all our *providers*
- Test in _test packages so we don't cheat with private symbols

Testing pt. 2

```
package state_test

import (
        . "launchpad.net/gocheck"
        "launchpad.net/juju-core/state"
        "launchpad.net/juju-core/version"
)

type MachineSuite struct {
        ConnSuite
        machine *state.Machine
}

var _ = Suite(&MachineSuite{})

func (s *MachineSuite) SetUpTest(c *C) {
        s.ConnSuite.SetUpTest(c)
        var err error
        s.machine, err = s.State.AddMachine()
        c.Assert(err, IsNil)
}
```

Testing pt. 3

```
id, err := m.InstanceId()
c.Assert(err, IsNil)
c.Assert(id, Equals, 1)

ch, ok := <-w.Changes()
c.Assert(ok, Equals, true)
c.Assert(ch.Changed, HasLen, 0)
c.Assert(ch.Departed, HasLen, 0)

actual := make(map[string]interface{})
err = unmarshal(ctx.Stdout.(*bytes.Buffer).Bytes(), &actual)
c.Assert(err, IsNil)
c.Assert(actual, DeepEquals, expected)
```

Testing pt. 4

```
FAIL: cmd_test.go:307: cmdSuite.TestUnexposeCommandInit

cmd_test.go:310:
    c.Assert(err, ErrorMatches, "no service specified")
... error string = "no service name specified"
... regex string = "no service specified"
```

Error handling

- We check errors a lot as most operations can fail
- Constantly considering the error path, and how to leave the state in a manner that actions can be retried later
- Moving to MongoDB will allow us to batch our requests and consolidate failure points

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Goroutine management

- Use the tomb package
- Tombs manage a goroutine's lifecycle
- Tombs let us wait for a goroutine to exit, and capture any error if this exit was unexpected

Goroutine management pt. 2

```
func (w *ChildrenWatcher) loop() {
        defer w.tomb.Done()
        defer close(w.changeChan)

        watch, err := w.update(zookeeper.EVENT_CHILD)
        if err != nil {
                w.tomb.Kill(err)
                return
        }

        for {
                select {
                case <-w.tomb.Dying():
                        return
                case evt := <-watch:
                        if !evt.Ok() {
                                w.tomb.Killf("watcher: session event: %v", evt)
                                return
                        }
                        watch, err = w.update(evt.Type)
                        if err != nil {
                                w.tomb.Kill(err)
                                return
                        }
                }
        }
}
```

Thank you. Questions ?

http://launchpad.net/juju-core

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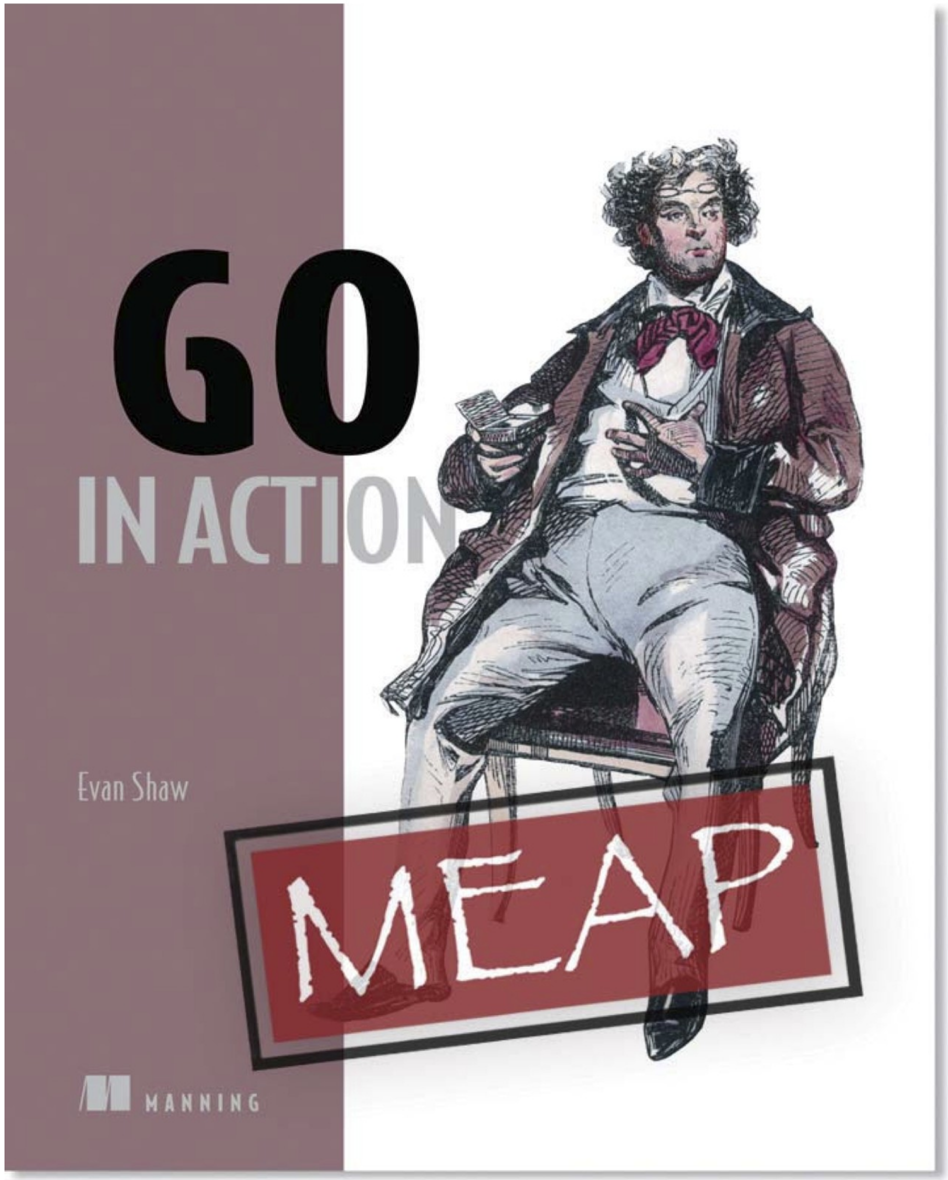
One more thing



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