ENABLING MICROSERVICE ARCHITECTURES WITH SCALA

Kevin Scaldeferri
Gilt Groupe
Sept 22, 2013

GILT

Kevin's Account | Premier Member: 3,404 pts | Invite Friends, Get $25 | Credits: $68.56 | My Cart 0

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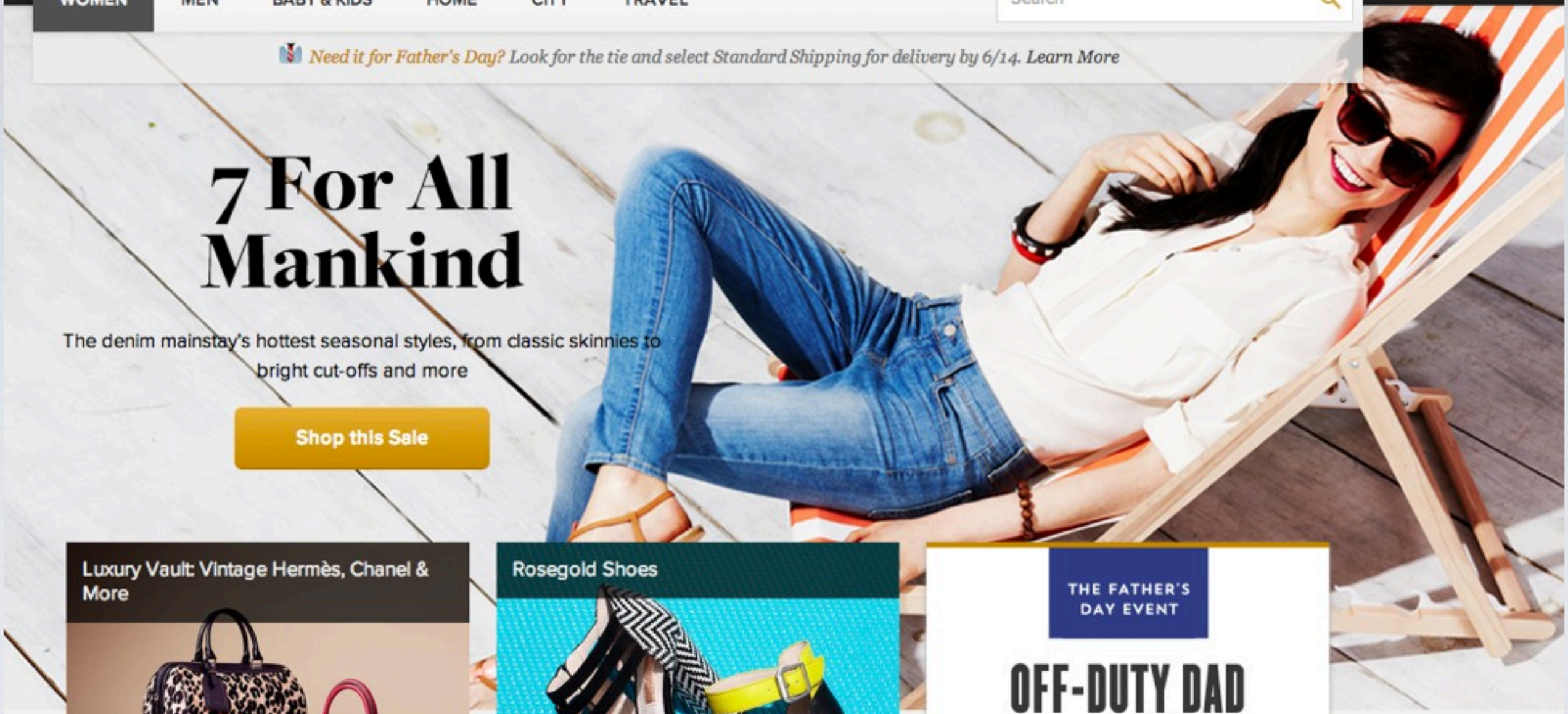
Need it for Father's Day? Look for the tie and select Standard Shipping for delivery by 6/14. Learn More

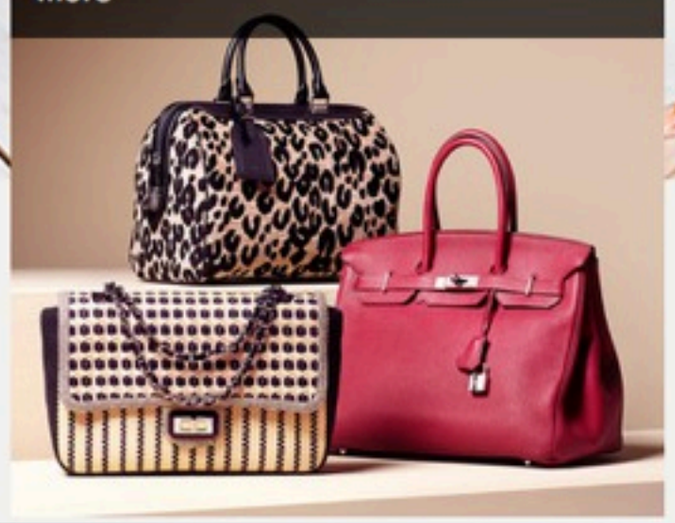
7 For All Mankind

The denim mainstay's hottest seasonal styles, from classic skinnies to bright cut-offs and more

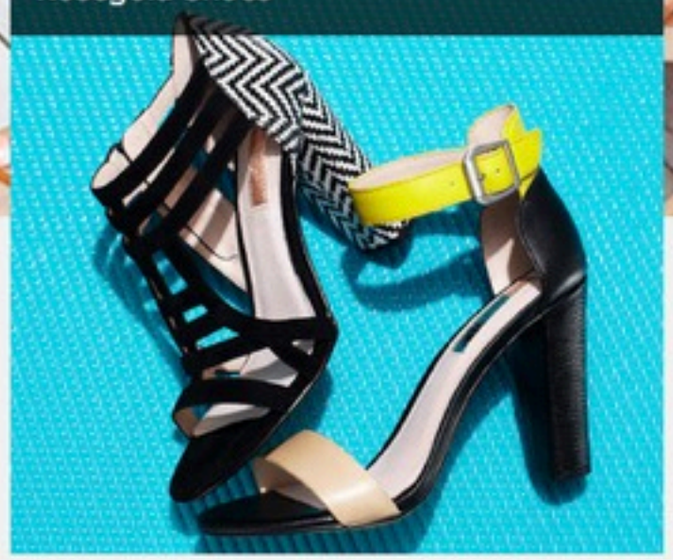
Shop this Sale



Luxury Vault: Vintage Hermès, Chanel & More



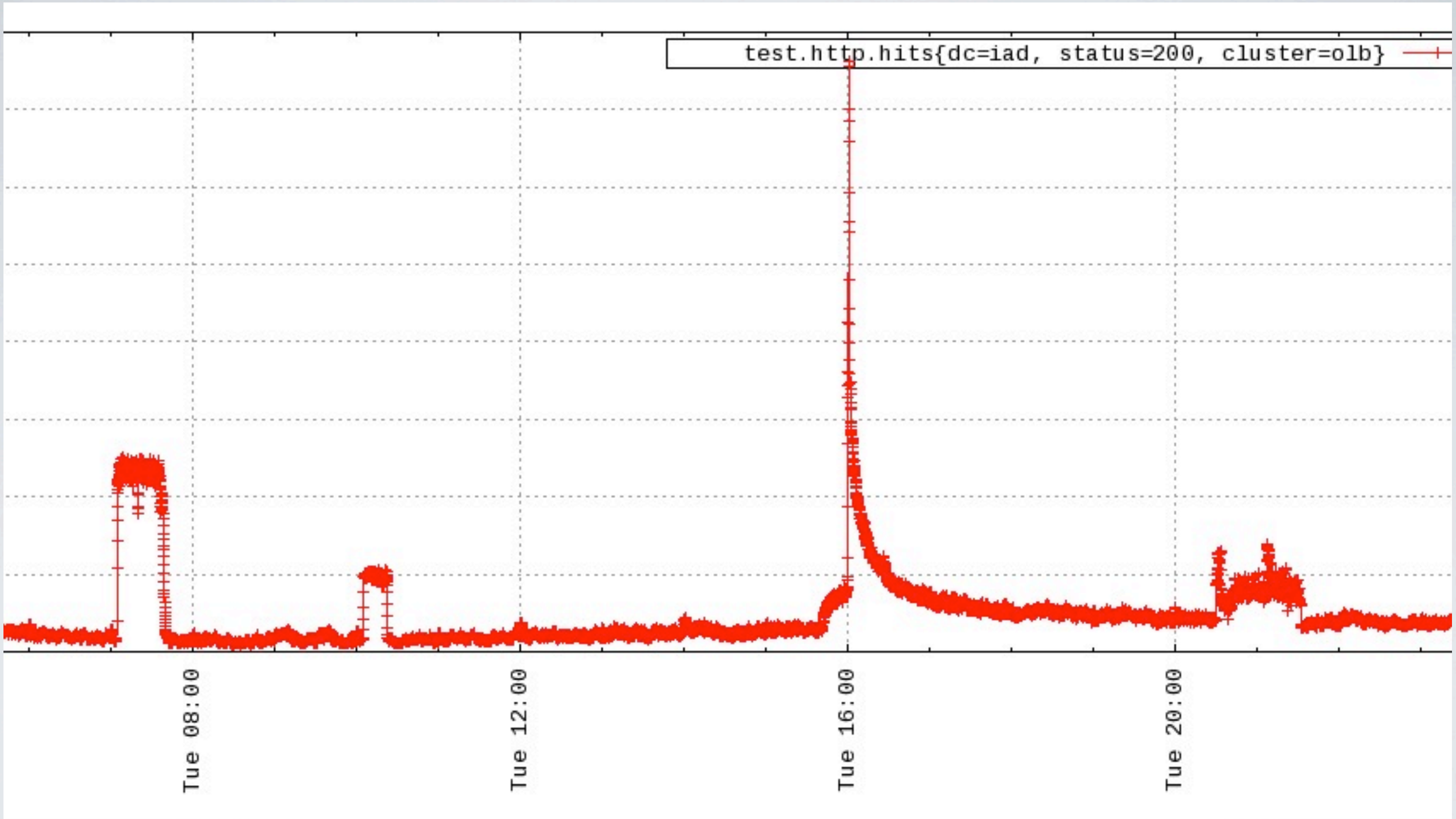
Rosegold Shoes



THE FATHER'S DAY EVENT

OFF-DUTY DAD

Gifts for the guy who likes to keep it casual and cool. Shop 7 For All Mankind, Trafalgar, Aqua by Toscano, and more.


test.http.hits{dc=iad, status=200, cluster=olb}
Tue 08:00
Tue 12:00
Tue 16:00
Tue 20:00

IN THE BEGINNING

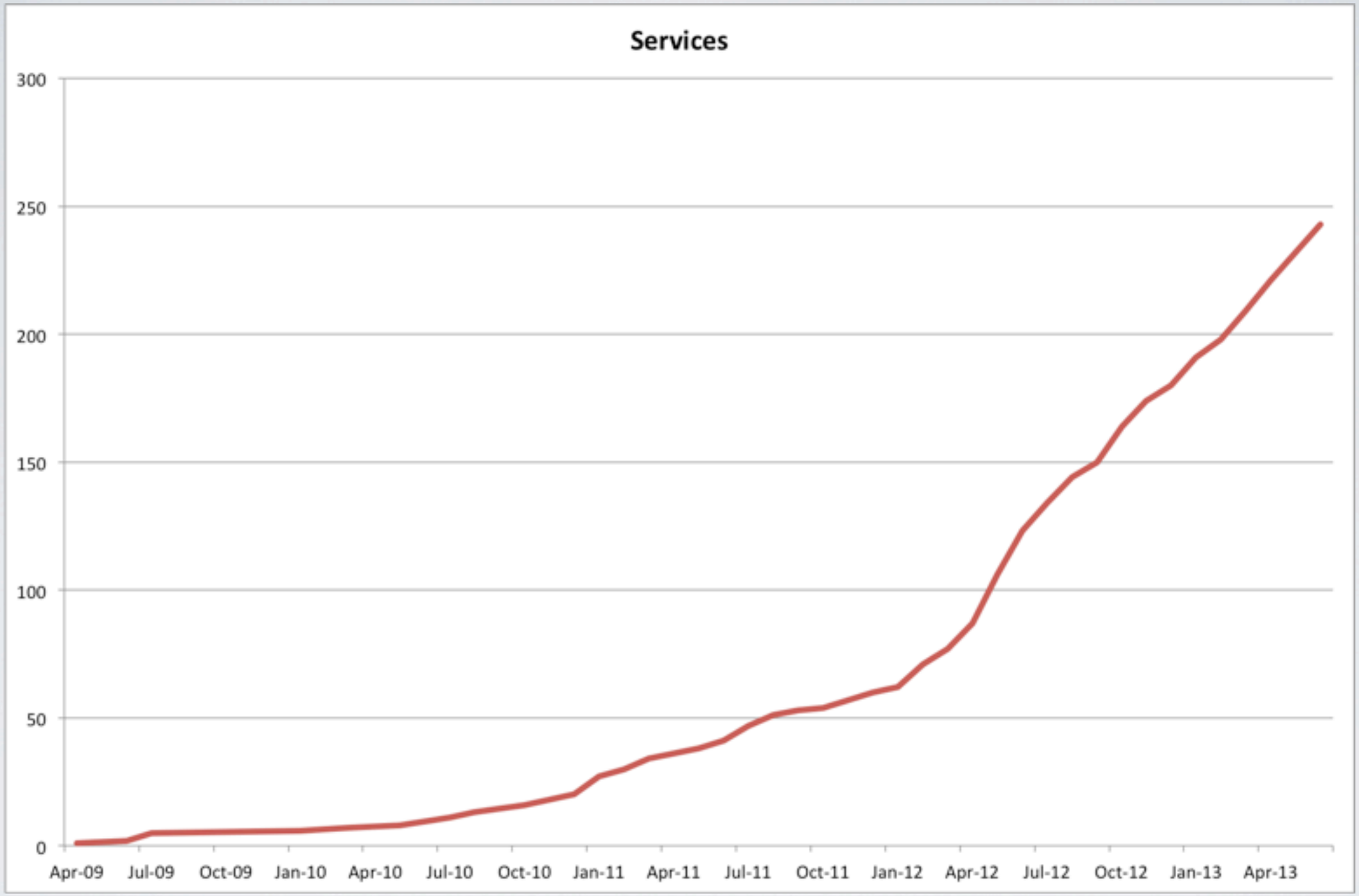
ONE (REALLY) BIG RAILS APP

- ~1000 models and controllers
- ~ 200k lines of Ruby
- ~ 50k lines of PostgreSQL stored procedures

PROBLEMS WITH MONOLITHIC DESIGN

- Unclear Ownership
- Complex Dependencies
- Lengthy Test Cycles
- Unexpected Performance Impacts

TRANSITION TO MICROSERVICES


Services
300
250
200
150
100
50
0
Apr-09
Jul-09
Oct-09
Jan-10
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Jul-10
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Jan-11
Apr-11
Jul-11
Oct-11
Jan-12
Apr-12
Jul-12
Oct-12
Jan-13
Apr-13

PRACTICES ENABLING MICROSERVICES

SBT (Build)

Testing

Cool Stuff

Configuration

Continuous Delivery

SBT

GILT-SBT-BUILD

- One big SBT plugin pulling in all other plugins
- Lots of custom behavior and standard configuration
- Super simple config for individual services

```
gilt.GiltProject.jarSettings

name := "lib-jenkins"

libraryDependencies ++= Seq(
  "net.databinder" %% "dispatch-core" % "0.8.8",
  "net.databinder" %% "dispatch-http" % "0.8.8"
)
```

```
object Build extends ClientServerCoreProject {
  val name = "svc-persistent-session"

  val coreDeps = ...
  val serverDeps = ...
  val clientDeps = ...
}
```

PLUGIN PROVIDES

- Nexus config
- Testing & Coverage Libraries
- RPMs
- Standard Run Scripts
- NewRelic Support
- Release Emails
- SemVer Analysis
- Dependency Heuristics
- Integration Builds
- Continuous Delivery hooks
- Auto-Upgrading
- ... and more....

CONFIGURATION

SHARED TYPE-SAFE CONFIG

- Common configuration in Zookeeper
- Override with local files or system properties
- Mapped into strongly-typed classes
- JSR-303 (Hibernate) Validation

```
case class MetricsConfiguration(
  @(NotEmpty @field) graphiteHost: String,

  @(Range(min=1024,max=65535) @field)
  graphitePort: Int
)
```

TESTING

CHALLENGES OF TESTING MICRO-SERVICES

- Functional tests are extremely valuable but difficult or impractical to set up
- Unit tests are easy to run, but require complicated mocking and are fragile and unreliable

SOLUTION

A testing framework which lets one test be both a unit test *and* a functional test

CAKE PATTERN

- A pattern for dependency injection and more
- Enables type-safe and scalable composition
- Uses Scala's self-types and multiple trait inheritance

```
trait ConfigurableClientFactory {
  self: Configuration =>

  lazy val instance: Client = ...
}

object ClientFactory
  extends ConfigurableClientFactory
  with GiltConfiguration
```

```
trait TestClients {
  lazy val testClient: Client =
    (
     new ConfigurableClientFactory
     with TestingConfiguration
    ).instance
}
```

```
abstract class ClientTest extends TestNGSuite
    with TestClients
{
  // Add your tests here
}

@Functional
class FunctionalClientTest
  extends ClientTest with FunctionalTest

@Capture
class CaptureClientTest
  extends ClientTest with CaptureTest

@Mock
class MockClientTest
  extends ClientTest with MockTest
```

- SBT configurations filter based on annotations
- `sbt functional:test`
  - Runs normally against services
- `sbt capture:test`
  - Like functional but records the results in files
- `sbt test:test`

UI TESTING

SELENIUM:TEST

- `sbt selenium:test`
- Built on ScalaTest Selenium DSL
- Automated browser testing with reusable components
- Makes heavy use of the Scala type system

```
@Selenium
class Example extends FlatSpecTestBase
with Matchers with ConfigurableBrowser
with LoggedInTestUser
with OnProductDetailPage
with AvailableToPurchaseItem
with InMens
with CloseBrowserAfterAllTests {

  "A size chart" should "be available" in {
   // test goes here
  }
}
```

```
trait LoggedInTestUser extends BeforeAndAfterAll
{
  self: Suite with WebBrowser =>

  override protected def beforeAll() {
    super.beforeAll()
    delete all cookies

    login(user, pass).foreach(msg => fail(msg))
  }
}
```

```
@Selenium
class Example extends FlatSpecTestBase
with Matchers with ConfigurableBrowser
with LoggedInTestUser
with OnProductDetailPage
with AvailableToPurchaseItem
with InMens
with CloseBrowserAfterAllTests {

  "A size chart" should "be available" in {
   // test goes here
  }
}
```

CONTINUOUS DELIVERY

IONCANNON

- Fully automated testing & deployment

- `sbt release` triggers deployment to a staging environment mirroring production

- Automated tests run

- Promote to production or rollback

IonCannon

Enter Search Query Here

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Latest Releases | Applications | FastTrack | Production

Summary of Latest IonCannon Activities

Latest Releases

	Name	Version	State	Targets	Released By	Released At	Deployed At	
+	svc-mobile-sale	1.9.9	released	mobile1	[redacted]@gilt.com	Wed Sep 18 2013 12:32:22 PDT		
+	svc-user	1.2.5	in_test	svc7	[redacted]@gilt.com	Wed Sep 18 2013 12:31:13 PDT		
+	svc-mobile-search	1.6.18	promoted	mobile1,mobile2	[redacted]@gilt.com	Wed Sep 18 2013 12:28:44 PDT		
+	svc-image	2.1.8	abandoned		[redacted]@gilt.com	Wed Sep 18 2013 12:00:17 PDT		
+	svc-digital-inventory	0.3.8	in_production		[redacted]@giltcity.com	Wed Sep 18 2013 11:56:33 PDT	Wed Sep 18 2013 12:02:49 PDT	
+	svc-payment-manager	0.1.0	in_production		[redacted]@gilt.com	Wed Sep 18 2013 11:37:00 PDT	Wed Sep 18 2013 11:43:59 PDT	
+	order_service	4.4.0	in_production		[redacted]@gilt.com	Wed Sep 18 2013 11:12:09 PDT	Wed Sep 18 2013 11:22:12 PDT	
+	svc-invoice-detail	0.0.39	in_production		[redacted]@gilt.com	Wed Sep 18 2013 10:50:07 PDT	Wed Sep 18 2013 10:58:05 PDT	
+	svc-digital-inventory	0.3.7	in_production		[redacted]@giltcity.com	Wed Sep 18 2013 09:02:43 PDT	Wed Sep 18 2013 09:08:39 PDT	

THE FUN STUFF

3 Left

Andrea Pompilio ☆

Corduroy Blazer

$399 Gilt

~~$860~~

2 Left

John Varvatos Collection ☆

Relax Fit Pants

$199 Gilt

~~$498~~

John Varvatos ☆

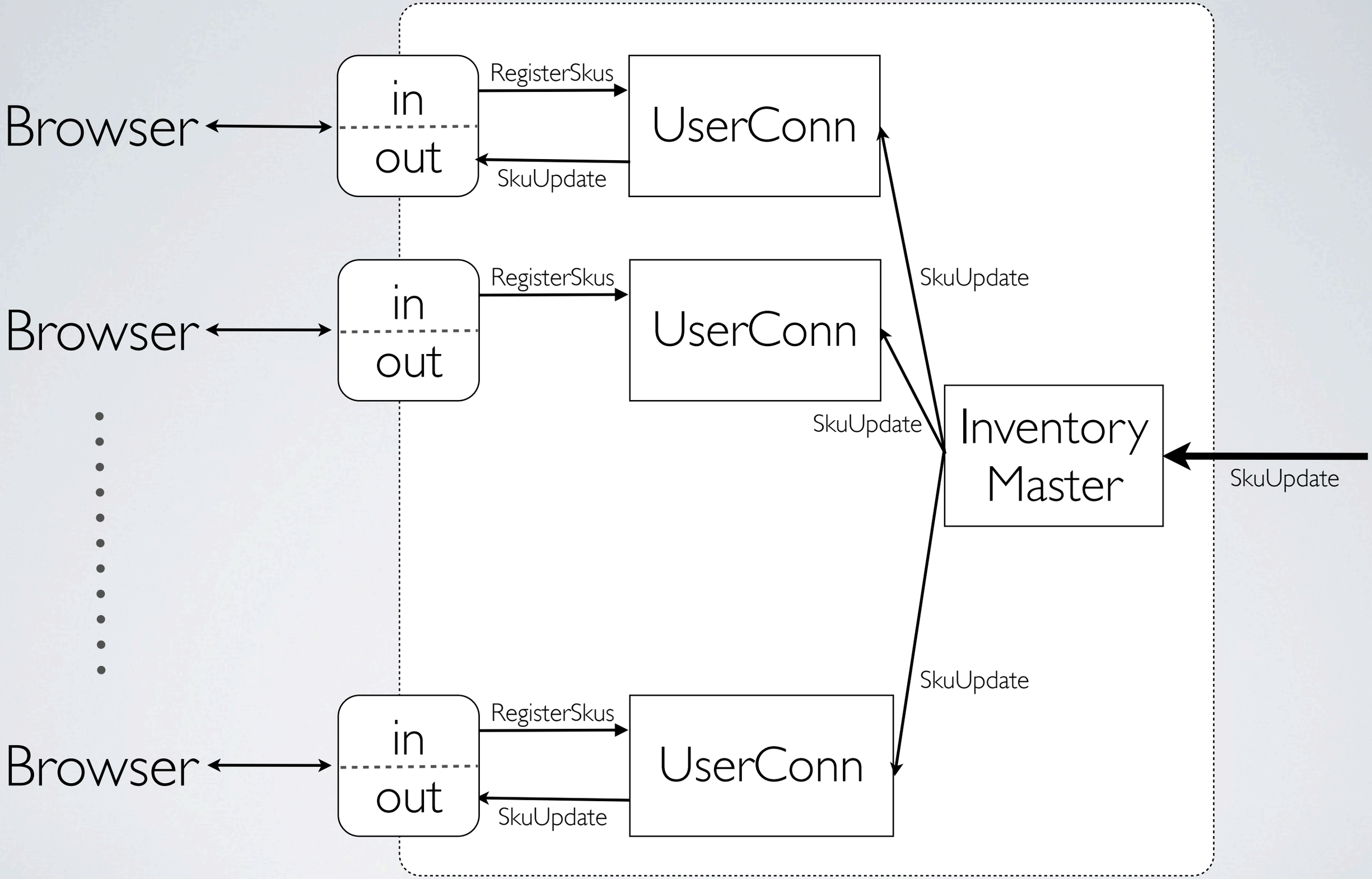
Linen Crewneck Tee

$49 Gilt

~~$158~~

LIVE INVENTORY UPDATES

- Creates excitement and urgency for shoppers
- Simple event-driven Play application
- Uses websockets and Akka actors


Browser
in
out
RegisterSkus
SkuUpdate
UserConn
Browser
in
out
RegisterSkus
SkuUpdate
UserConn
SkuUpdate
Inventory
Master
SkuUpdate
SkuUpdate
Browser
in
out
RegisterSkus
SkuUpdate
UserConn

FREEFALL SALES

- Essentially a Dutch auction
- Similar Web Sockets & Actors implementation

Freefall

Gilt Freefall: The Wow Moment

6544
People Now Viewing

First Chance	Second Chance	Third Chance	Last Chance!
Starts at 3:00 PM	*Starts at 3:05 PM*	*Starts at 3:10 PM*	*Starts at 3:15 PM*

First Chance starts in 8 seconds

Hermès
Mykonos Swift Birkin 30cm

Versace Collection
Flecked Suit

Cassina
LC4 'Blonde' Chaise

THANK YOU

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kevin@scaldeferri.com