ENABLING MICROSERVICE ARCHITECTURES WITH SCALA

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Gilt Groupe
July 8, 2013

GILT

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

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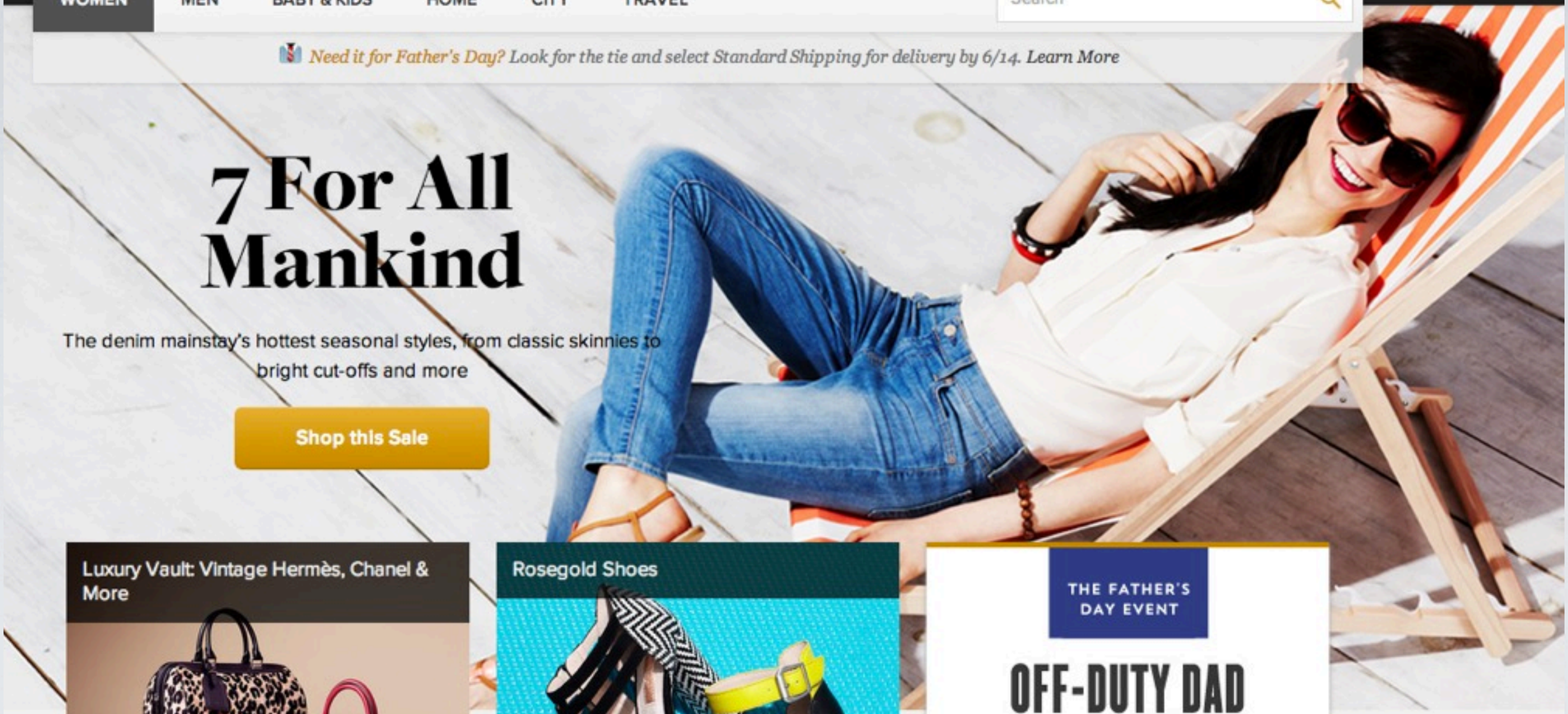
Search

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

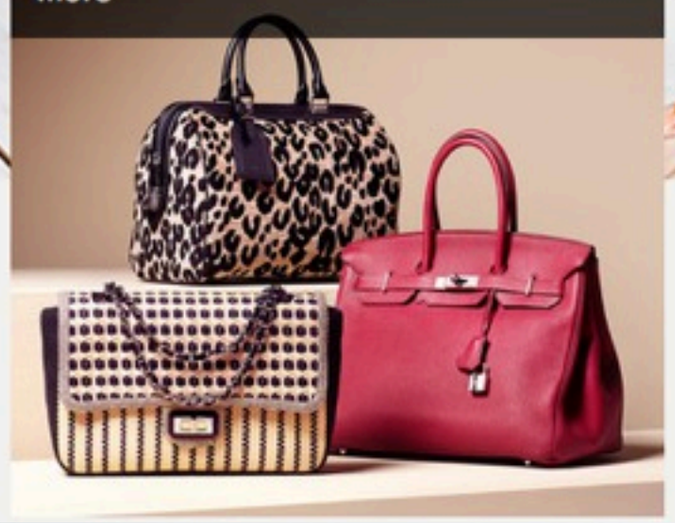
7 For All Mankind

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

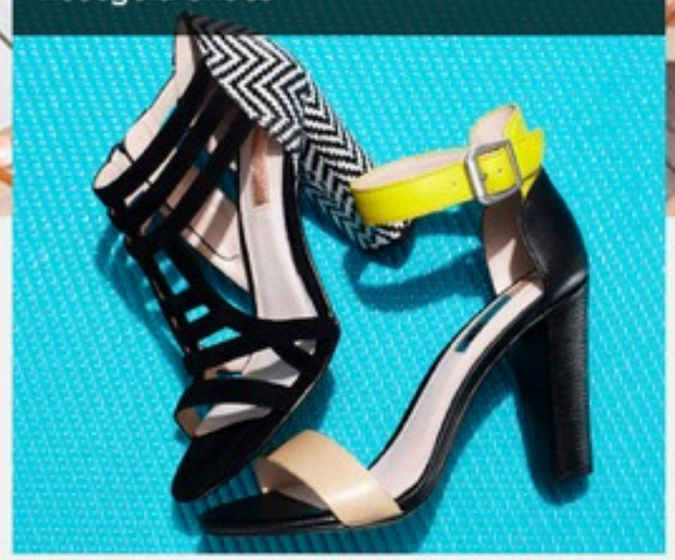
Shop this Sale



Luxury Vault: Vintage Hermès, Chanel & More



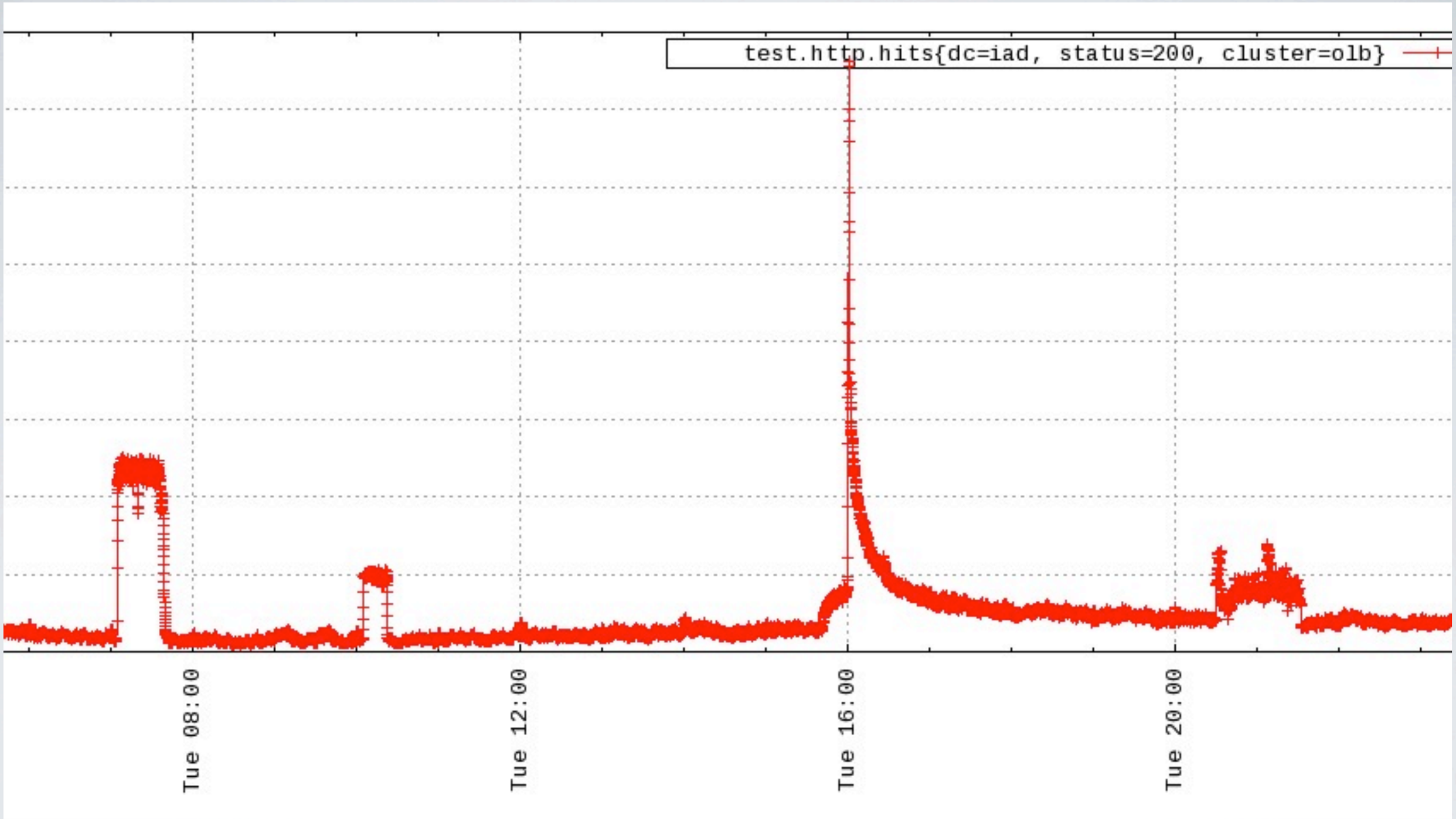
Rosegold Shoes



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

CULTURE

- Rapid feature development
- Rapid experimentation
- Find what works, discard what doesn't

IN THE BEGINNING

ONE (REALLY) BIG RAILS APP

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

PROS OF MONOLITHIC DESIGN

- Rapid (Initial) Development
- Simple development
- Simple deployment
- Simple operational model

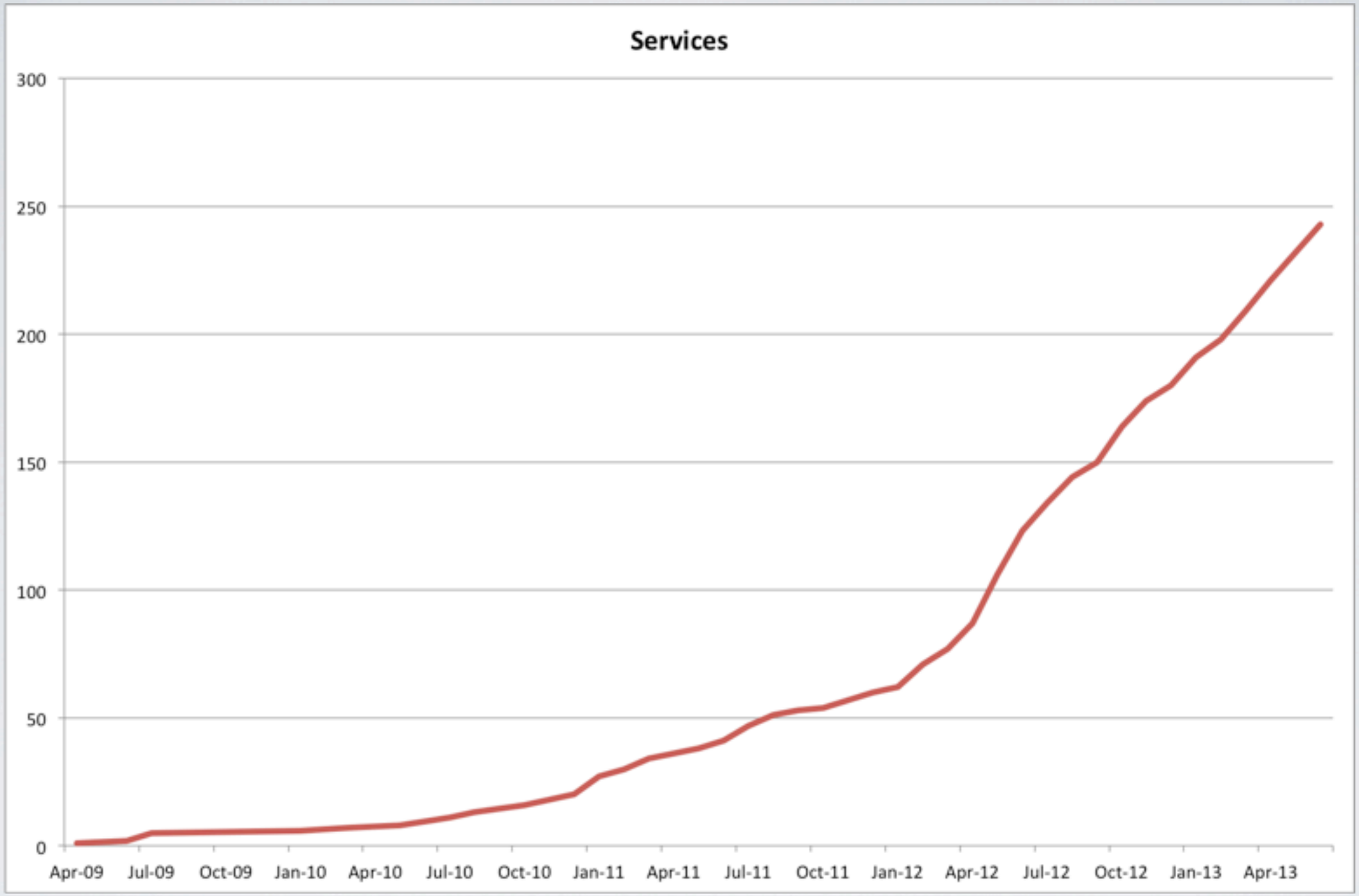
CONS OF MONOLITHIC DESIGN

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

DAY OF RECKONING

THE LOUBOUTIN INCIDENT

GETTING
(THE MICROSERVICES)
RELIGION


Services
300
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50
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Apr-09
Jul-09
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Jul-12
Oct-12
Jan-13
Apr-13

EARLY DAYS

- Pure Java
- Moving fast, lots of C&P
- Lots of snowflakes and competing approaches
- Ant- and Rake-based builds installed via git submodule
- Mix of manual and Capistrano deployment

SLOWLY CONVERGED TO A UNIFORM SET OF PRACTICES

- SBT
- Configuration
- Testing
- Live Web UIs

SBT

WHAT'S COOL ABOUT SBT

- Fast incremental builds of Scala & Java
  - ~compile, ~test
- Interactive shell & console
- Configuration is "just" Scala code

BUT...

- Very sophisticated use of Scala
- Subtle mental model
- Can be hard to debug
- Not something we want app developers to worry about

GILT-SBT-BUILD

- One big SBT plugin pulling in all other plugins and configuration
- Plugin is versioned just like any other software
  - (Actually builds itself!)
- 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
- Add'l Dependency Heuristics
- Integration Builds
- Continuous Delivery hooks
- ... 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 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
- http://jonasboner.com/2008/10/06/real-world-scala-dependency-injection-di/
- http://nescala.org/#keynote

MAKING A CAKE

- Construct the layers differently for testing and production
- Swap in mock components
- Or a different configuration provider

```
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 2.0 Selenium DSL
- Automated browser testing with reusable components
- All tests written in Scala
- Tests can be run in any environment
- Selenium grid available

```
@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))
  }
}
```

MAKING THE SHOPPING EXPERIENCE REAL-TIME

3 Left

Andrea Pompilio ☆

Corduroy Blazer

$399 Gilt

~~$860~~

2 Left

John Varvatos Collection ☆

Relax Fit Pants

$199 Gilt

~~$498~~

John Varvatos ☆

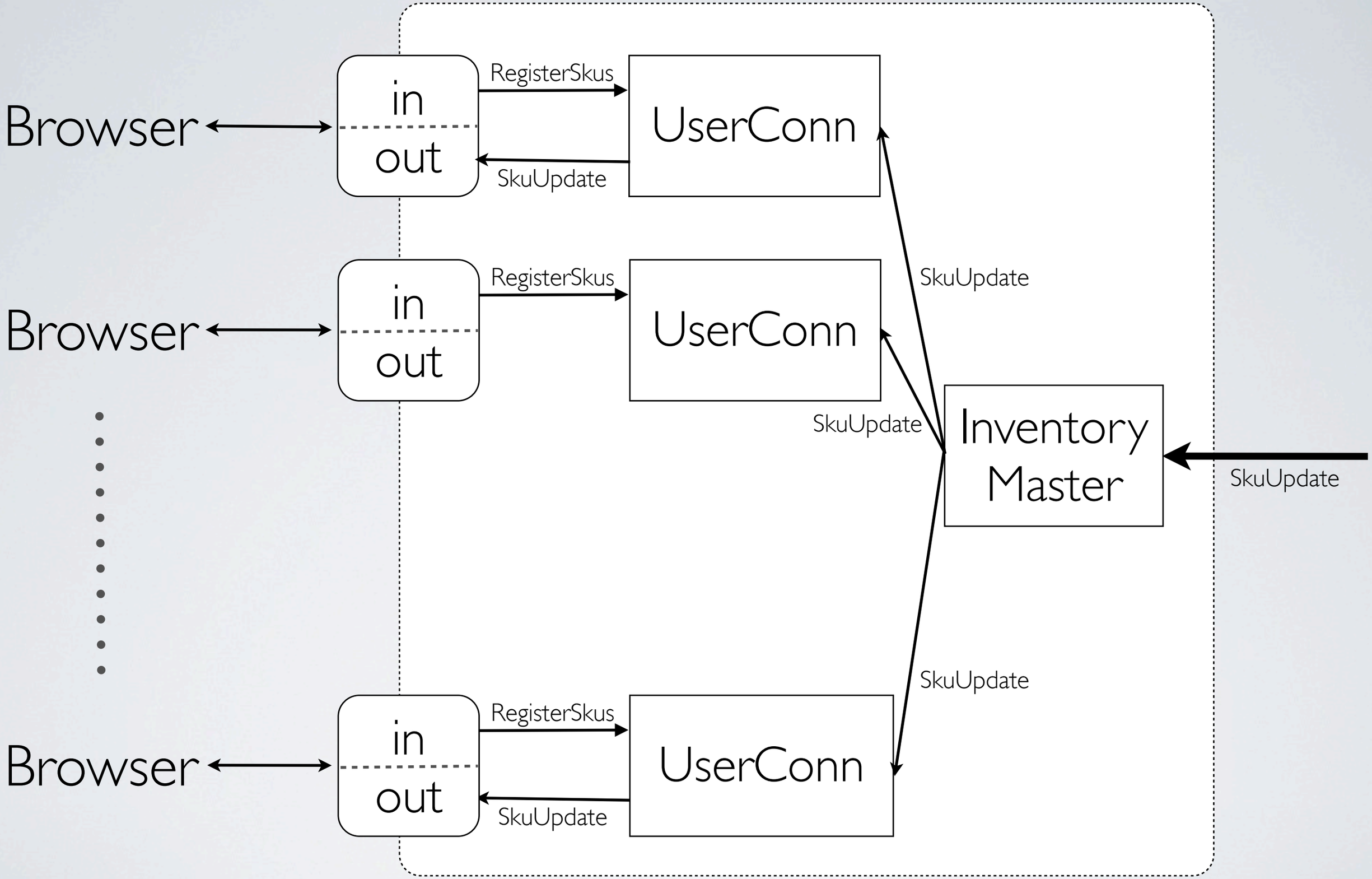
Linen Crewneck Tee

$49 Gilt

~~$158~~

LIVE INVENTORY UPDATES

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


Browser
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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
Starts at 3:00 PM

Second Chance
Starts at 3:05 PM

Third Chance
Starts at 3:10 PM

Last Chance!
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

QUESTIONS?