# Mastering Mustang, Developing Dolphin

**Danny Coward**
Senior Staff Engineer

**Mark Reinhold**
Java SE Chief Engineer

Sun Microsystems

TS-3439

|  |  |  |
|---|---|---|
| 1.4.0 | Merlin | 2002/2/13 |
| 1.4.1 | Hopper | 2002/10/16 |
| 1.4.2 | Mantis | 2003/5/29 |
| 5.0 | Tiger | 2004/9/30 |
| 6 | Mustang | 2006/10 |
| 7 | Dolphin | 2008/H2 |

No more maintenance releases (5.1, 6.1, ...)
Update releases every 8–16 weeks (latest: 5.0u6)

Tiger

JMX™ BigDecimal z-ordering jstat

RMI dynamic proxies updates Generics Gnome Skins jps

JDBC™ Rowsets Autoboxing extended for loop

faster startup jconsole printf JVM™ sharing

synth L&F SAX 2.0 Concurrency utilities

Unicode Surrogates importing constants OpenGL

IP reachability Ocean L&F SASL performance XAWT

unsynchronized StringBuffer improved cookie support

XML Schema apt DOM 3 JVM Monitoring

fatal error handlers

Stack trace API Remote JMX improved footprint

varargs swing printing AMD64 Enumerated types

XDnD Packed JARs metadata OCSP

New Memory Model

scanning JVMPI Profiling

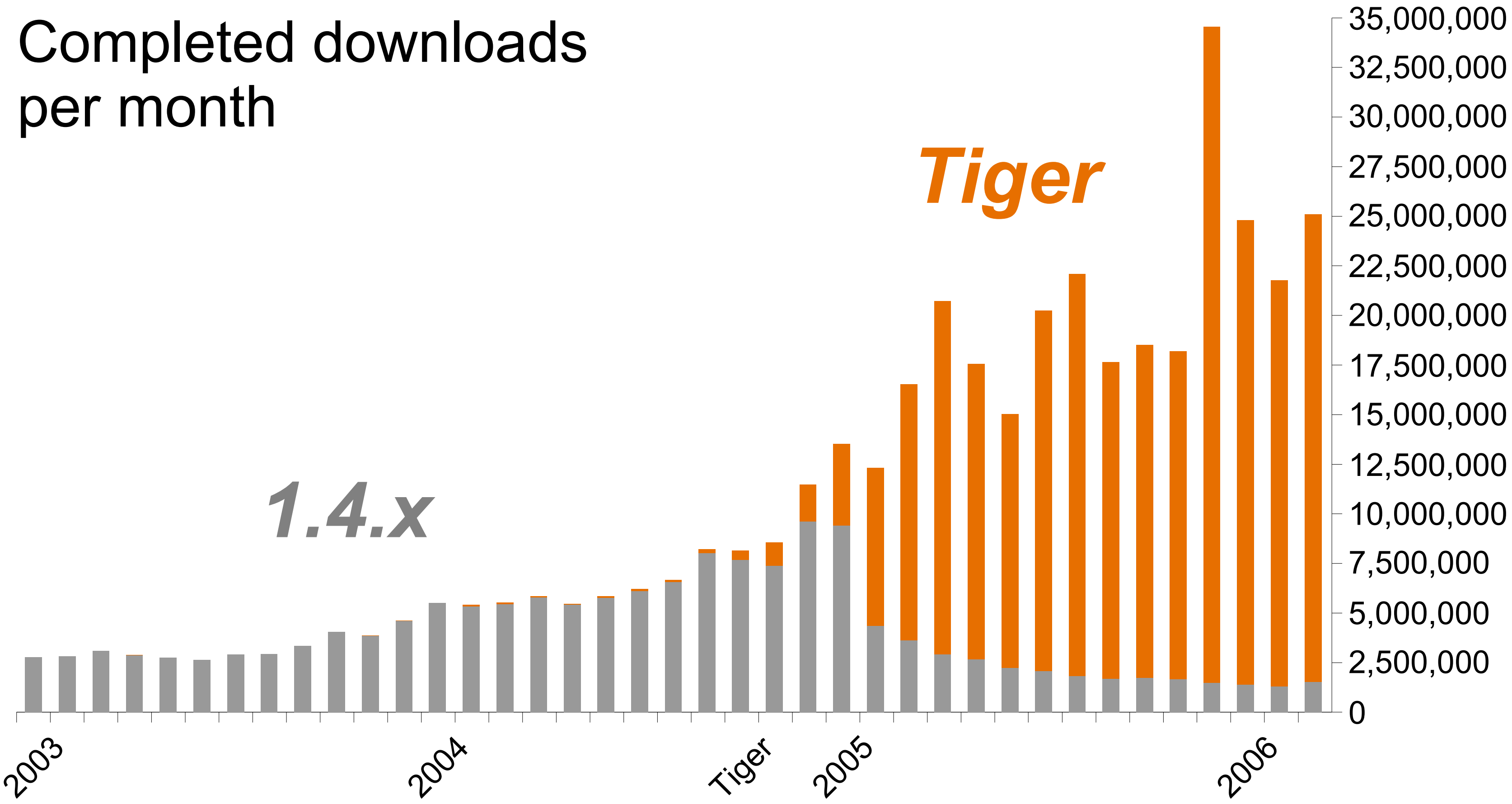
performance ergonomics

# It’s Time to Upgrade!

**Tiger is *Everywhere***<br>
**Tiger is *Stable***<br>
**Tiger is *Fast***

*“My 1.4 apps run great on 5.0!”*

# Tiger Is Everywhere



# Tiger Is Everywhere

Over

**262,295,496**

downloads served!

# Tiger Is Everywhere

**Pre-installed on**

**> 60 %**

**of new PCs**

# Tiger Is Stable

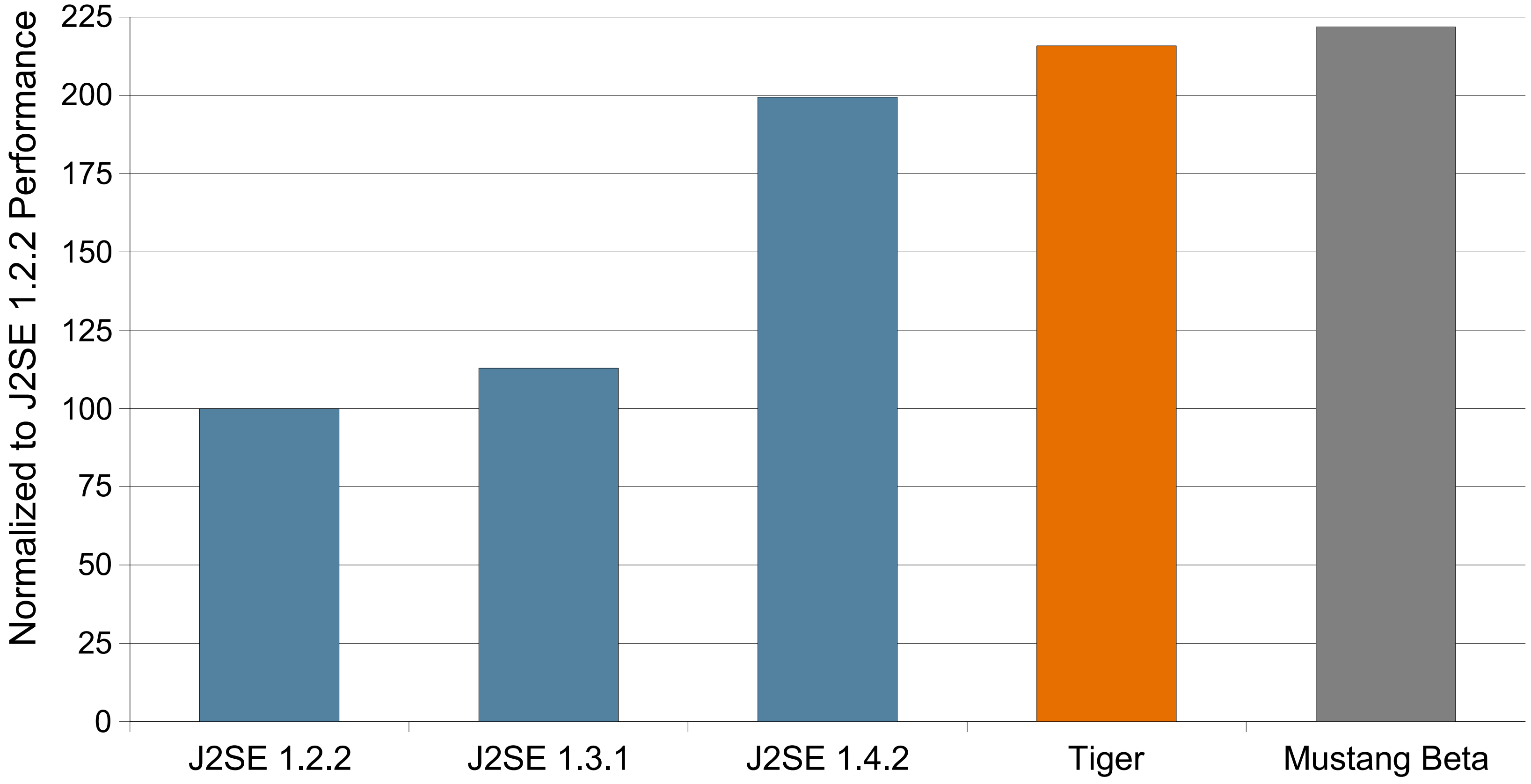
**≥ 99.999 %**

availability

Previous best: 99.98% for 1.4.2

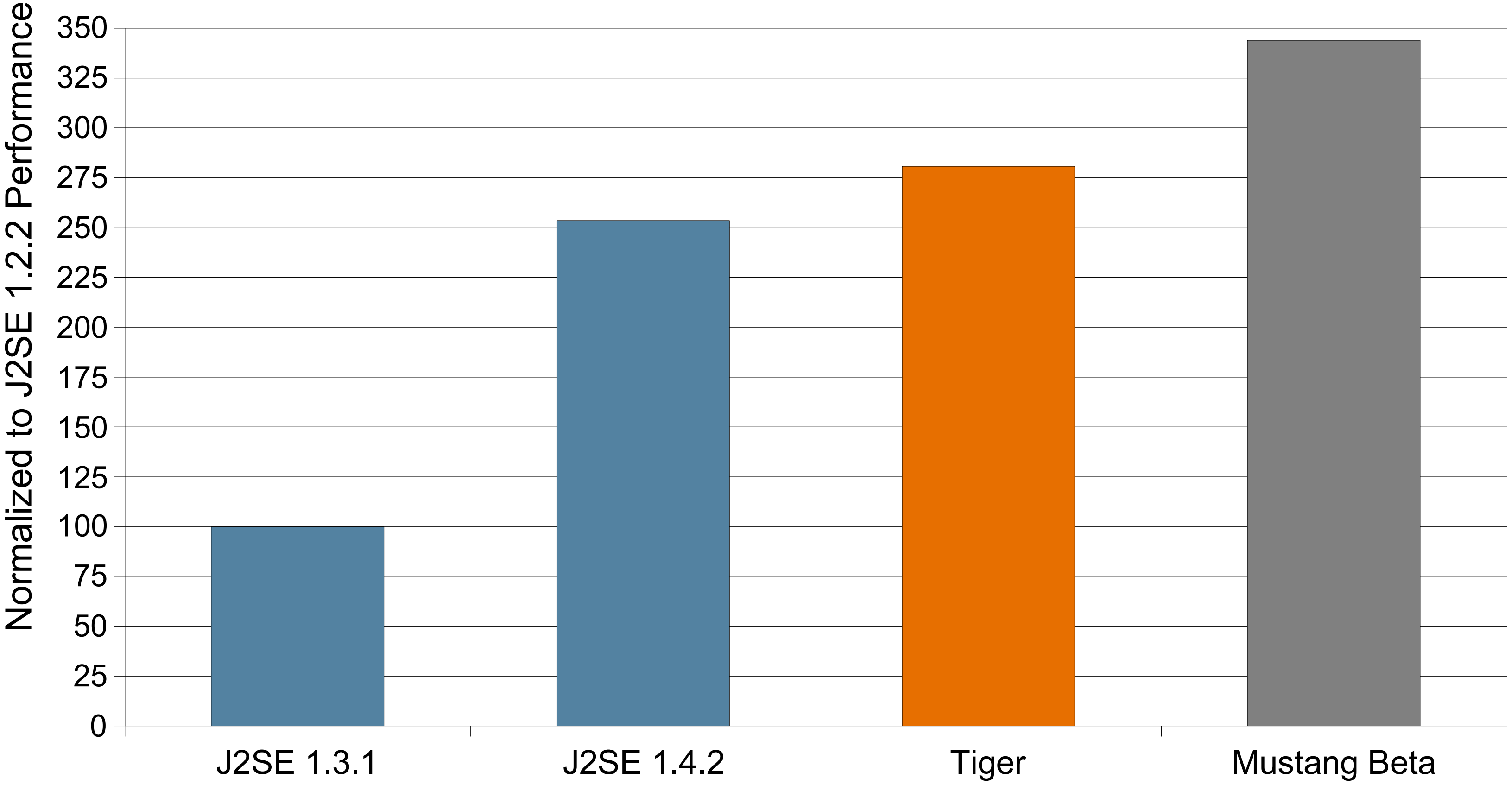
# Tiger is Fast

## Client Benchmark: SwingMark



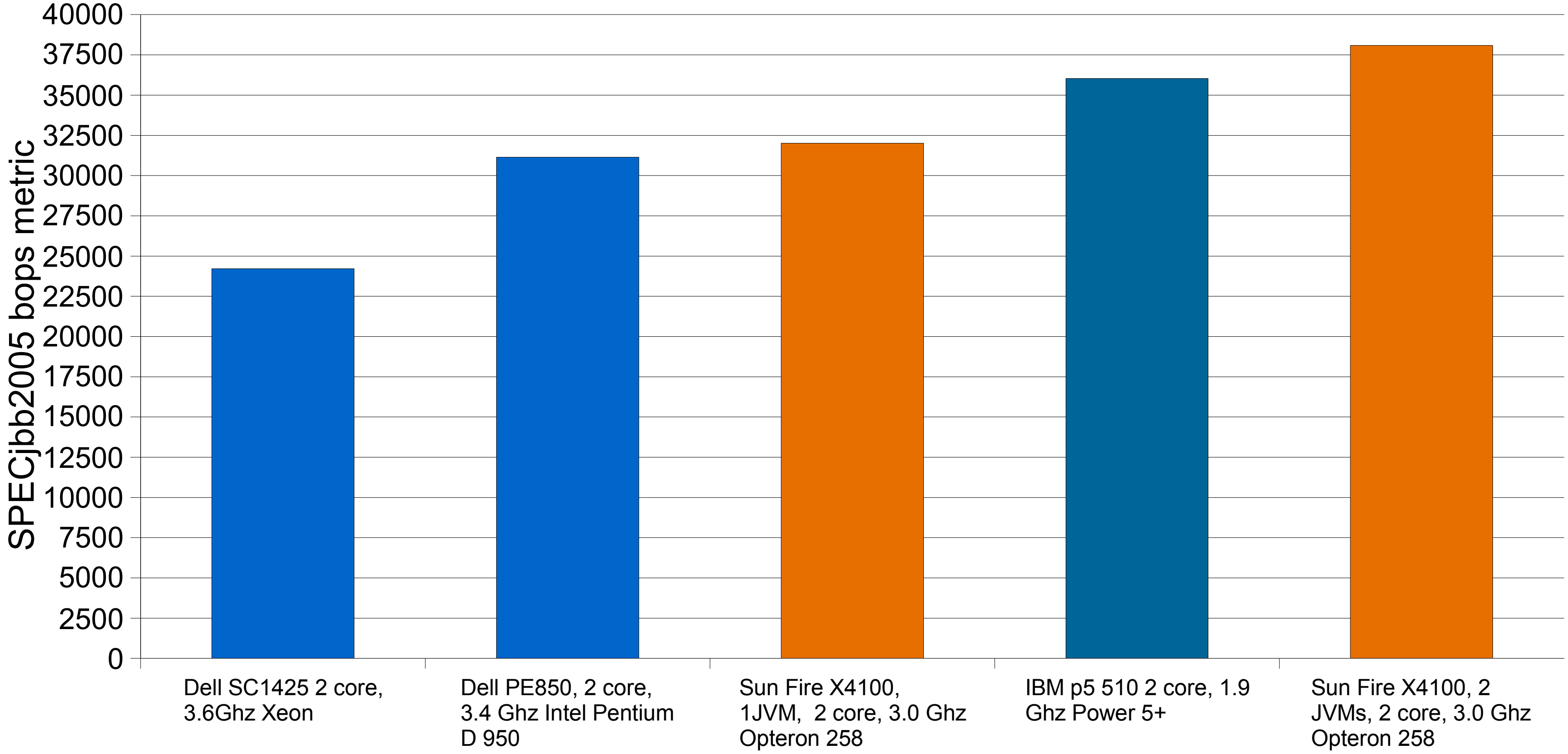
# Tiger Is Fast

## Server Benchmark: SPECjbb2000



# x64 SPECjbb2005 Performance

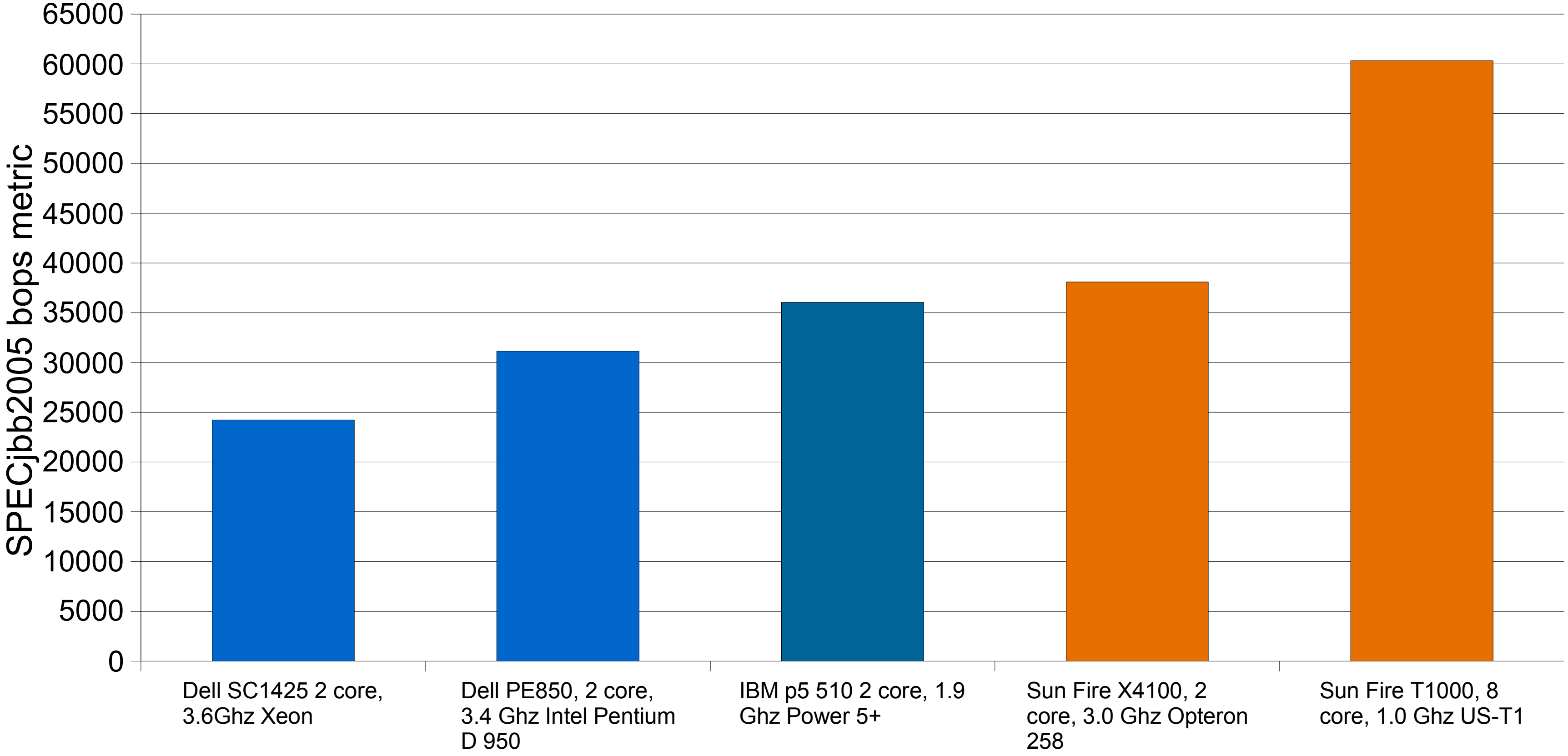
## Sun Fire™ X4100 Server Wins



SPECjbb2005 Sun Fire X4100 (2 chip, 2 core, 2 threads) 32,018 SPECjbb2005 bops, 32,018 SPECjbb2005 bops/JVM, Sun Fire X4100 (2 chip, 2 core, 2 threads) 38,090 SPECjbb2005 bops, 19,045 SPECjbb2005 bops/JVM, submitted for review, IBM eServer p5 510 (2 chips, 2 cores, 4 thread) 36,039 bops, 36,039 bops/JVM, Dell SC1425 (2 chips, 2 cores, 4 thread) 24,208 SPECjbb2005 bops, 24,208 SPECjbb2005 bops/JVM, Dell PE 850 (1 chip, 2 cores, 2 thread) 31,138 SPECjbb2005 bops, 31,138 SPECjbb2005 bops/JVM. SPEC® and the benchmark name SPECjbb™ are trademarks of the Standard Performance Evaluation Corporation. Competitive benchmark results stated above reflect results published on www.spec.org as of May 11, 2005. For the latest SPECjbb2005 benchmark results, visit http://www.spec.org/osg/jbb2005.

# One-RU SPECjbb2005 Performance

## Sun Fire T1000 “Niagra” Server Wins



SPECjbb2005 Sun Fire T1000 (1 chip, 8 core, 32 threads) 60,323 SPECjbb2005 bops, 15,081 SPECjbb2005 bops/JVM submitted for review, Sun Fire T2000 (1 chip, 8 core, 32 threads) 74,365 SPECjbb2005 bops, 18,591 SPECjbb2005 bops/JVM submitted for review, IBM eServer p5 510 (2 chips, 2 cores, 4 thread) 36,039 bops, 36,039 bops/JVM, Dell SC1425 (2 chips, 2 cores, 4 thread) 24,208 SPECjbb2005 bops, 24,208 SPECjbb2005 bops/JVM, Dell PE 850 (1 chips, 2 cores, 2 thread) 31,138 SPECjbb2005 bops, 31,138 SPECjbb2005 bops/JVM. SPEC® and the benchmark name SPECjbb™ are trademarks of the Standard Performance Evaluation Corporation. Competitive benchmark results stated above reflect results published on www.spec.org as of May 11, 2005. For the latest SPECjbb2005 benchmark results, visit http://www.spec.org/osg/jbb2005.

Mustang

Compiler API

MBeans metadata

JTable upgrades

Longhorn Look & Feel

Splash screens

Split Verifier

Windows system tray

Unicode Normalizer

Services

Parallelize Concurrent GC

Attach on demand

chmod

JConsole upgrades

Core JVM

SwingWorker

Annotation processors

performance

Parallel old-space GC

Web Services Stack

Password prompting

JVM DTrace

Docs in Chinese

JDBC 4.0

GroupLayout

LCD fonts

Faster JNI

JAXB 2.0

Free disk space

More gfx acceleration

Improved OOM diagnosability

JVM & CLR Co-Existence

More desktop integration

FireFox support

Pluggable Locales

Scripting Languages

Native L&F Fidelity

HTTP cookie manager

More GC Ergonomics

XAWT

JavaScript™ engine

XML digital signatures

Improved text rendering

# JSR 270: Java SE 6 Release Contents

## Expert Group Members

Apache
BEA
David Bock
Capgemini
Google
HP
IBM
Intel
JBoss

Doug Lea
Daniel Leuck
Metasolv
Oracle
Sam Pullara
Michael Santos
SAP
SAS Institute
ThoughtWorks

# JSR 270 Status

- Early Draft posted 2005/12/21
  - `http://jcp.org/en/jsr/detail?id=270`
- Changes from original JSR submission:
  - Dropped JSR 260: Javadoc™ tool Tag Update
  - Dropped JSR 268: Smart-Card I/O API
- Additional changes since EDR:
  - Dropped “Reflective access to parameter names” feature (#402)
  - Added **`javax.swing.GroupLayout`**
- Public Draft will be posted early this summer

# Mustang Component JSRs

202: Class File Update

199: Compiler API
269: Annotation Processors
221: JDBC$^{\text{TM}}$ 4.0 software
223: Scripting

105: XML Digital Signature
173: Streaming API for XML
222: JAXB 2.0

250: Common Annotations
181: WS Metadata
224: JAX-WS 2.0

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*Ease of Development*

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*Ease of Development*

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*XML*

105: XML Digital Signature
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***Web Services***

**250: Common Annotations**
**181: WS Metadata**
**224: JAX-WS 2.0**

# Mark's Mustang Top Ten List

## Interesting Stuff That You Might've Missed…

10. Attach-on-demand monitoring
9. JConsole plugin API
8. jhat OQL
7. Solaris™ Dynamic Tracing (DTrace) support
6. Annotation processing done by javac
5. Class-path wildcards
4. Free disk-space API
3. Password prompting
2. **`javax.swing.GroupLayout`**
1. JAX-WS can do RESTful web services

# Mustang Milestone Releases

| | |
|---|---|
| Beta1 | 2006/02/16 |
| Beta2 | 2006/06 |
| Release Candidate | 2006/09 |
| **Final Release (FCS)** | **2006/10** |

*Get ready! The Mustangs are coming…*

6
6
5
2

# Apache Derby in Mustang

http://db.apache.org/derby

- Derby: A small-footprint standards-based embedded relational database engine
- Will be co-bundled in Sun's Mustang JDK™ software
  - Will not be in the JRE (it's too big)
  - Is ***not*** a required part of the Java SE 6 specification
- Great out-of-the-box starter database for developers
  - Will implement all the new JDBC 4.0 software features
- Developers can redistribute Derby with their applications

# *How do you Master a Mustang?*

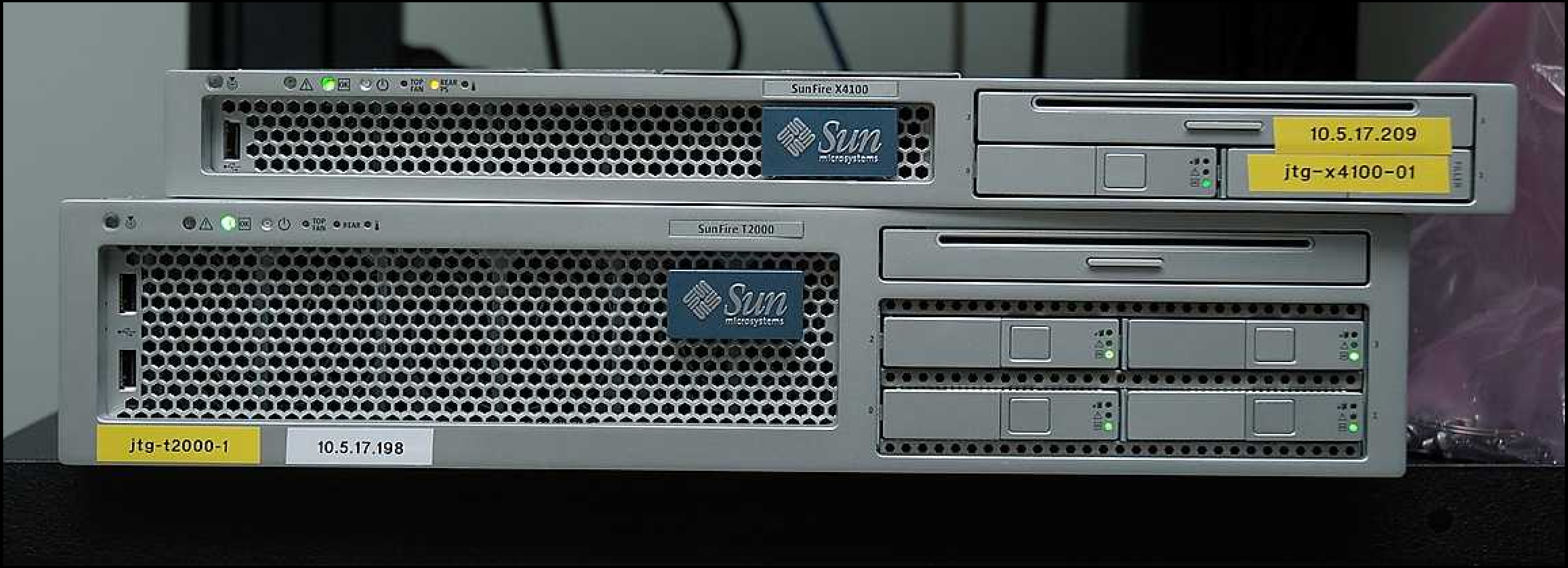
Sun microsystems
ENTERPRISE 6500
Sun microsystems
StorEDGE
DELL

10.5.20.44
JMQ-SQA-V60-4
KOOK 6
SOL 10
SunFire V60x
10.5.20.194
JMQ-SQA-V60-3
kook 1
RH AS 3.0
SunFire V60x
10.5.20.184
JMQ-SQA-V60-2
kook 2
RH AS 2.1
SunFire V60x
10.5.20.193
JMQ-SQA-V60-1
kook 3
SOL 9
SunFire V60x

URTMI-DTF-3
10.5.20.134
KEPLER 5
FY06
URTLI-DTF-7
10.5.20.259
KEPLER 6
FY06
RED HAT
ASA
URTSI-DTF-1
10.5.20.138
SOLARIS 9
KEPLER 3
FY06
ASA
10.5.20.160
KEPLER 4
FY06
ASA
KEPLER 7
RED HAT
RED HAT

COR-O-VAN
SCA14-1370
P3...CAB
DELL

PRE-INSTALLED
VORINSTALLIERT
FÖRINSTALLERAT
PREINSTALADO
PREINSTALLATI
SOLARIS
JAVA
PRÉ-INSTALLÉ
インストール済み
미리 설치
Property of
SUN MICROSYSTEMS, INC.
764552
764553
FY06
Sun
microsystems
ULTRA 10
ULTRASPARC


SunFire X4100
Sun microsystems
10.5.17.209
jtg-x4100-01
SunFire T2000
Sun microsystems
jtg-t2000-1
10.5.17.198

# Enter the Matrix…

- 577 machines worldwide, most in a grid
- Three architectures: x86, amd64, SPARC®
- 24 operating systems:
  - Red Hat Linux 7.2, 9.0
  - RHAS 2.1, 3.0, 4.0
  - Fedora Core 3, 4
  - Solaris 8, 9, 10, 11 OS
  - SuSE Linux 8.1, 9.0, 9.3
  - Windows 98 SE, ME, NT, 2000, 2000 Pro, 2000 Server, 2003, 2003 AS, XP Home, XP Pro, and Vista

# Enter the Matrix…

- 577 machines worldwide, most in a grid
- Three architectures: x86, amd64, SPARC
- 24 operating systems:…
- 84 tested configurations
- 92,316 conformance tests (JCK)
- 20,244 functional tests
- 6,930 regression tests
- Test cycle length: 5 weeks—Tier 1
  10 weeks—All configurations

# “Big Apps” Testing

- Large, real-world applications
  - Run under high stress
  - For extended periods of time (3 days–3 weeks)
- Apps include
  - Tomcat 5.5.9
  - Sun App Server 8.1
  - Three other commercial app servers
- We’re constantly evaluating new “big apps”
  - Let us know if you have any candidates!

# How Do You Master a Mustang?

- Continuous multi-platform testing
- Crack-the-Verifier Contest
- Regressions Challenge
- Careful engineering process
  - Multiple code reviews
  - Unit and regression tests
  - Special review of compatibility-related changes

… Based on ten years of experience

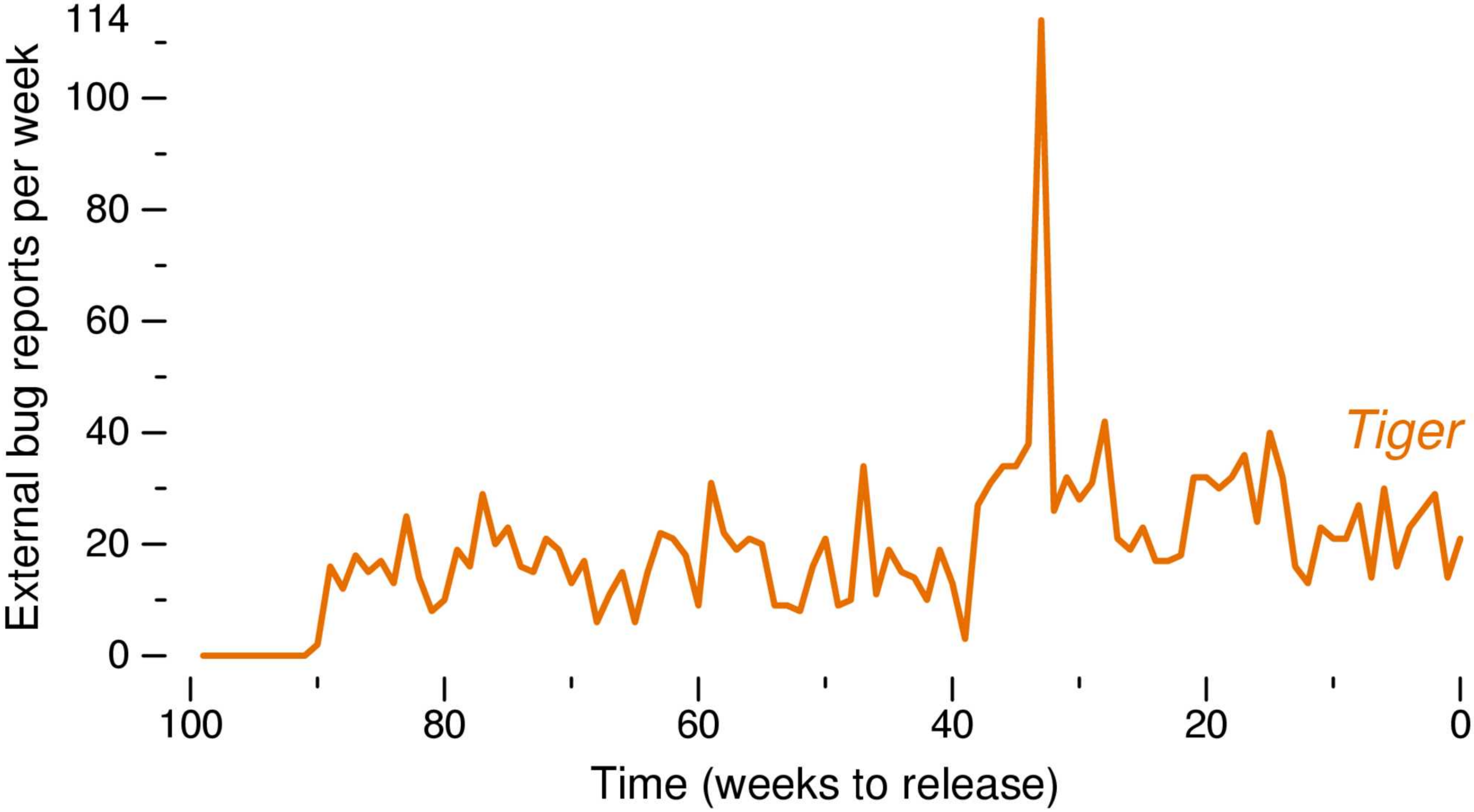
# Mustang Snapshots

| | |
|---|---|
| b15 | 2004/12/09 |
| b16 | 2004/12/16 |
| b17 | 2004/12/23 |
| b19 | 2005/01/13 |
| b20 | 2005/01/20 |
| b21 | 2005/01/27 |
| b22 | 2005/02/03 |
| b23 | 2005/02/10 |
| b24 | 2005/02/17 |
| b25 | 2005/02/24 |
| b26 | 2005/03/03 |
| b27 | 2005/03/11 |
| b28 | 2005/03/18 |
| b29 | 2005/03/24 |
| b30 | 2005/03/31 |
| b31 | 2005/04/07 |
| ⋮ | ⋮ |
| b76 | 2006/03/16 |
| b77 | 2006/03/23 |
| b78 | 2006/03/30 |
| b79 | 2006/04/06 |
| b80 | 2006/04/13 |
| b81 | 2006/04/20 |
| b82 | 2006/04/27 |
| b83 | 2006/05/04 |
| b84 | 2006/05/11 |

**http://mustang.dev.java.net**

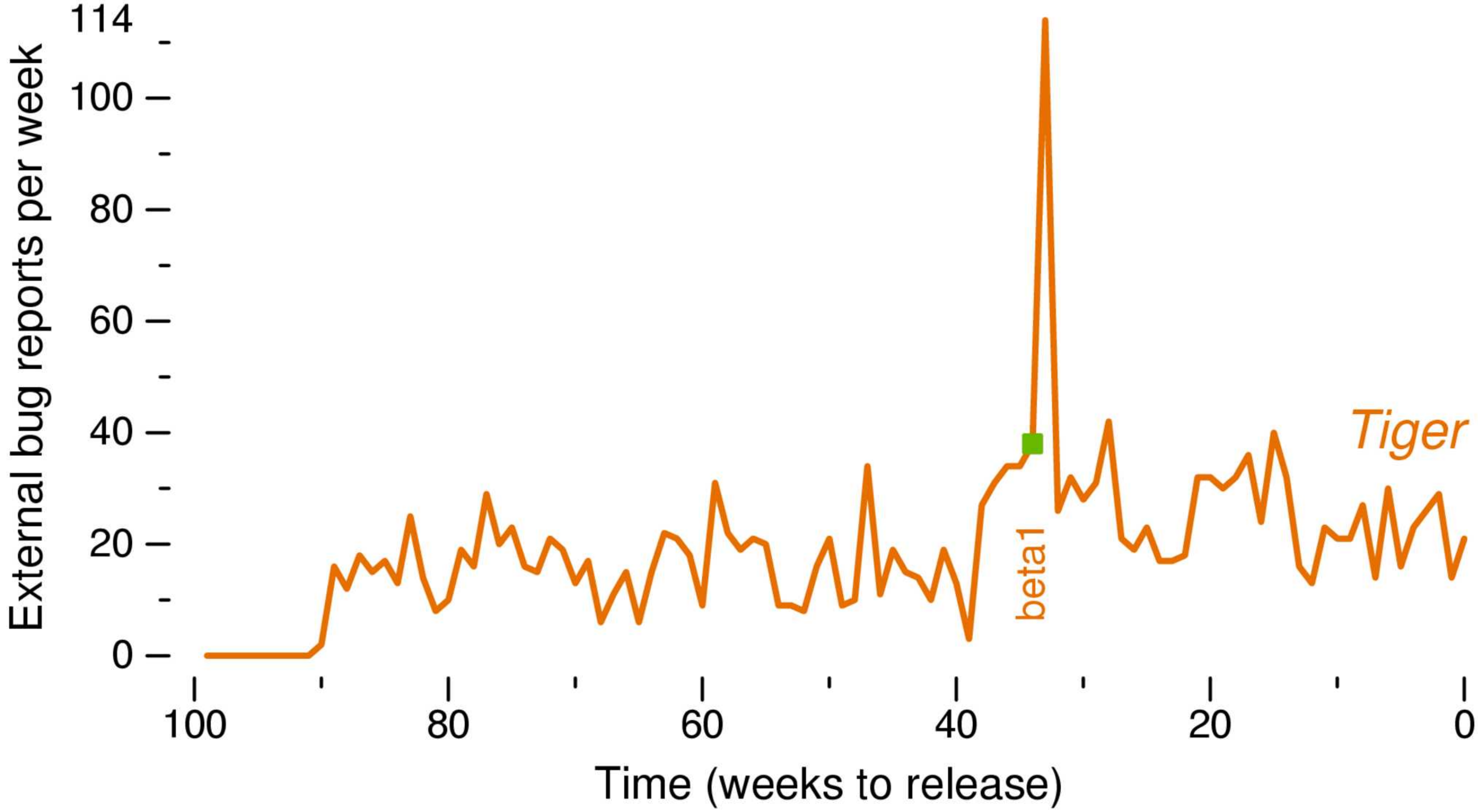
# Mustang Snapshots

## Experimental Results



# Mustang Snapshots

## Experimental Results



# Mustang Snapshots

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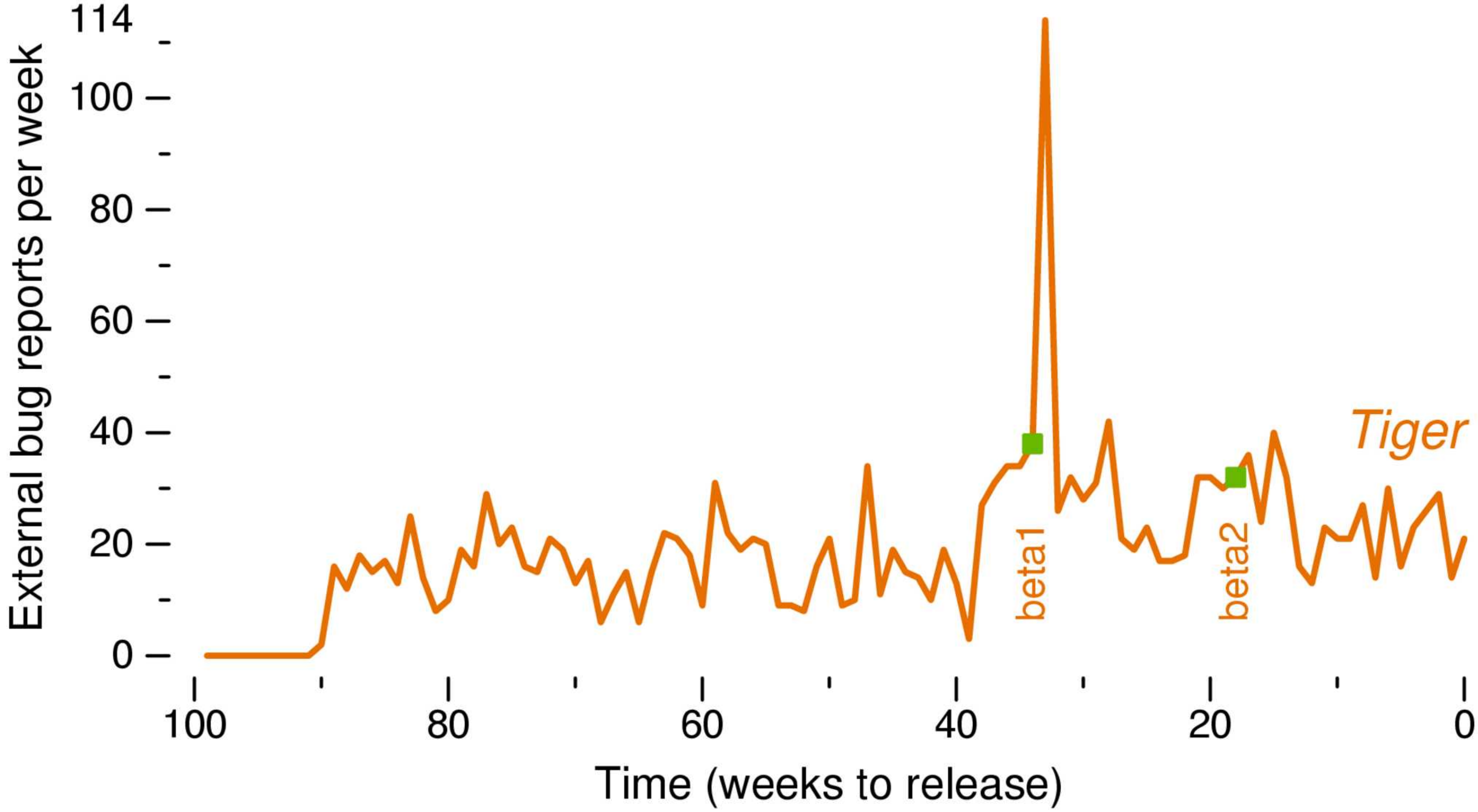
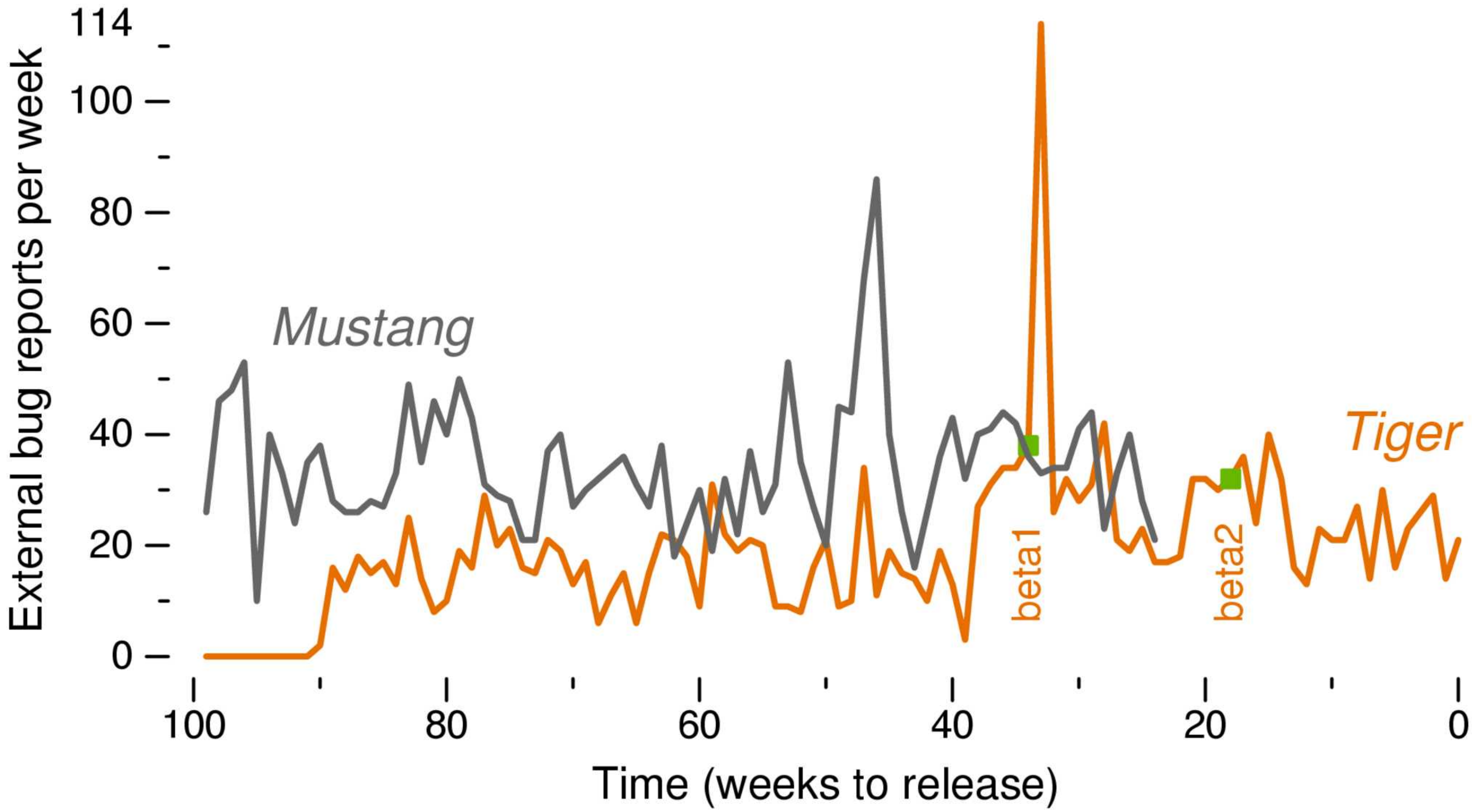


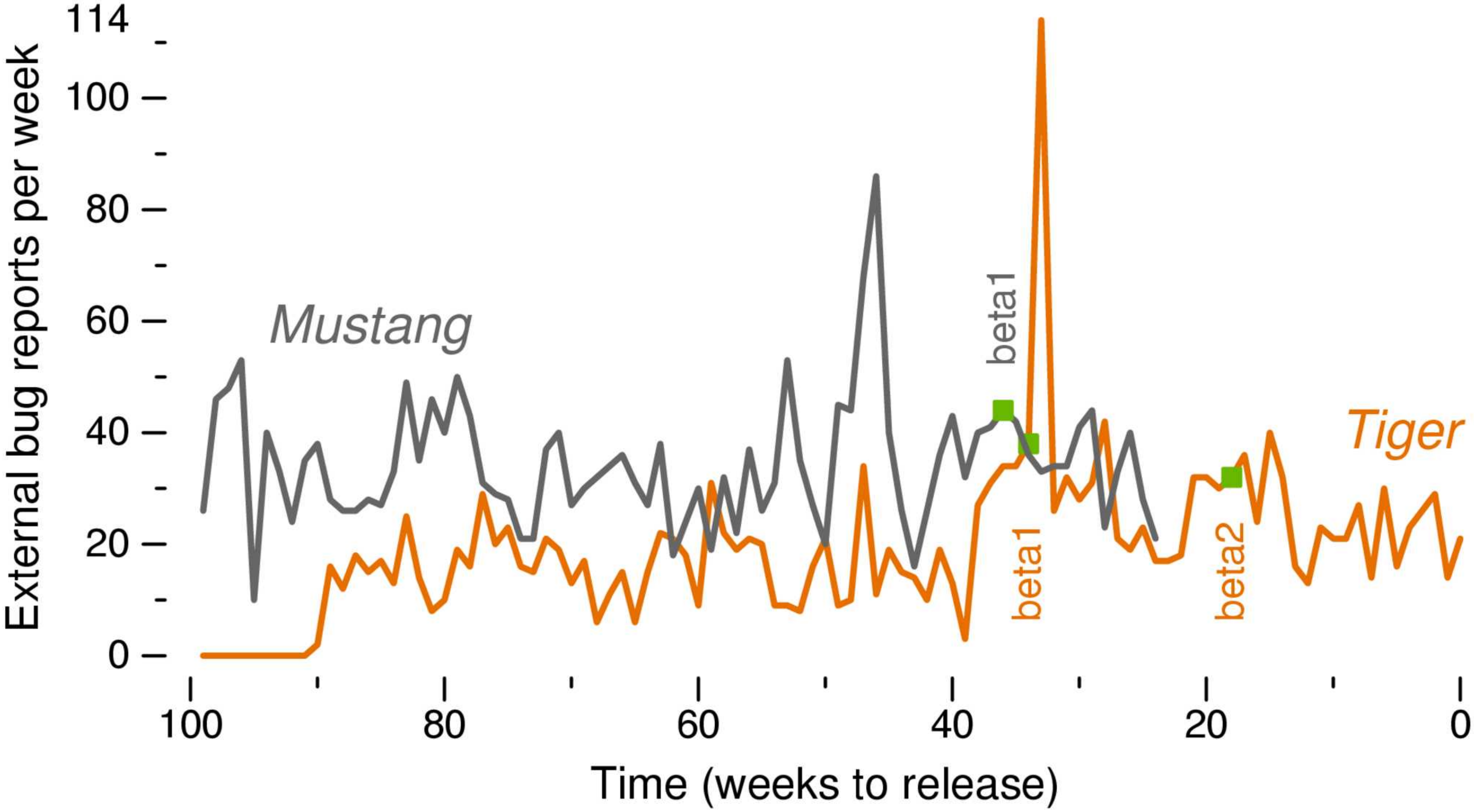
# Mustang Snapshots

## Experimental Results



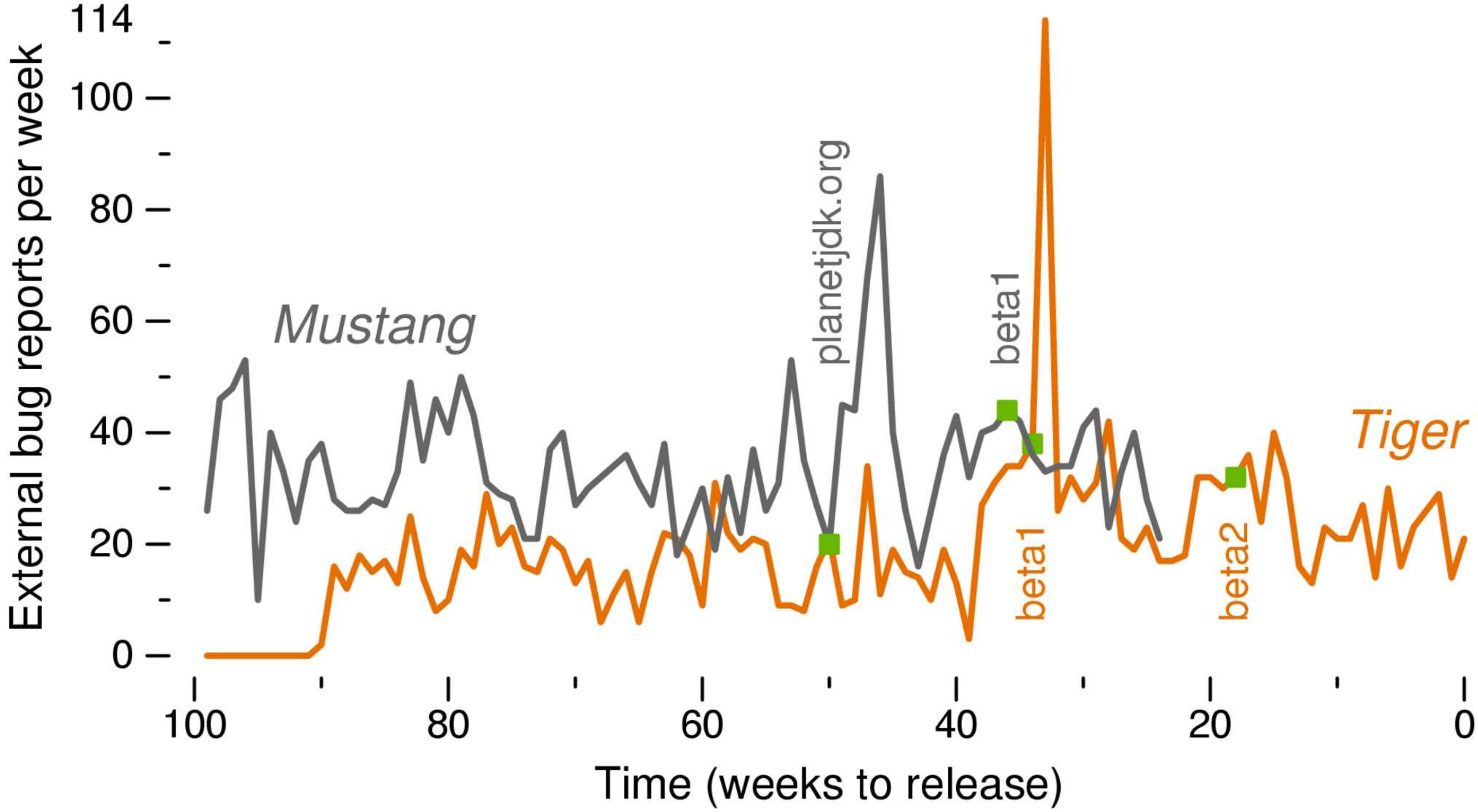
# Mustang Snapshots

## Experimental Results



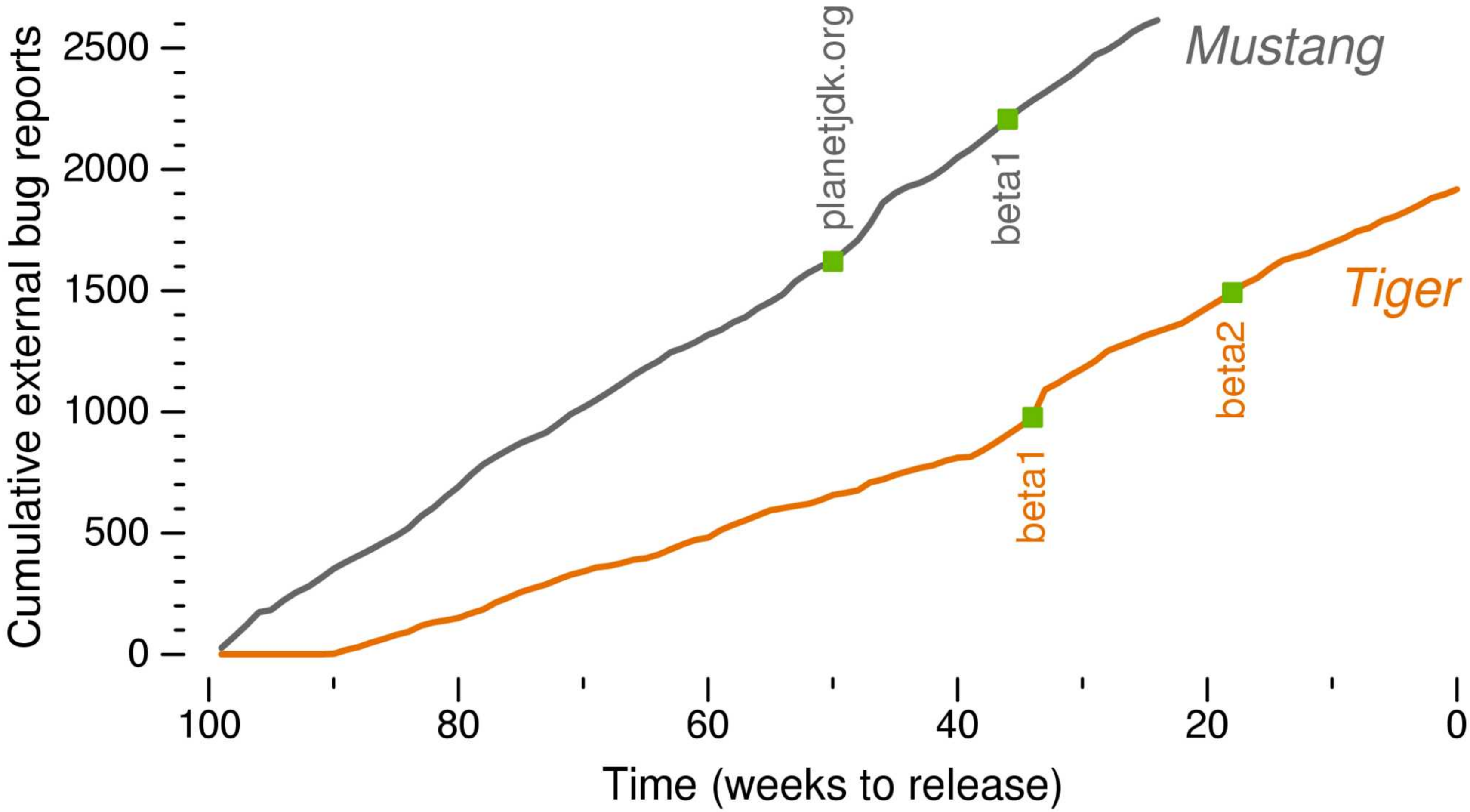
# Mustang Snapshots

## Experimental Results



# Mustang Snapshots

## Experimental Results



# Mustang Snapshots: Conclusions

- Effects of weekly snapshot builds
  - More feedback throughout the release (≥ doubled)
  - Formal beta releases don’t yield more feedback
- Formal beta releases are very expensive
  - Forked line of development
- Formal betas are confusing to developers
  - On 2006/2/16 you could get either
    - b59f, which was originally created 2005/11/3, *or*…
    - b72, which was up to date
- Upshot: Mustang beta2 will be very lightweight
  - Just a couple of weeks of testing
  - Dolphin betas might also be done this way

http://mustang.dev.java.net

# JDK Software Community Status

`community.java.net/jdk`

- 100,000+ visitors/month
- 1000+ members
- 300+ contributors
- 270+ contributions so far
- Projects: Tiger, Mustang, MVM, Dolphin
- Starter bugs
- Active technical forums and blogs
- Real culture change within Sun

*JDK Software Community*

# Javadoc Tool Translations

- Translate the J2SE™ 5.0 API (Javadoc toolss) into your native language
- Initiated by Brazilians, now open to all languages!
- Easy way to contribute
- Joint java.net JDK/JUGS Communities project

**jdk-api-localizations.dev.java.net**

*JDK Software Community*

# Distributions Project

- Collaborate on packaging for Linux and OpenSolaris™ operating system
- Help make the JDK software available on your favorite OS platform
- Solve problems, help insure compatibility, make Java technology easier to acquire and use!

**`jdk-distros.dev.java.net`**

*JDK Software Community*

# Interested? Find Out More!

- Stop by the booth
  Pod #723
- Attend the BOF
  BOF-0178, Wed. 8:30 pm–9:30 pm
  Moscone Hall E
- Come to the party!
  **TONIGHT** 8:30 pm–10:00 pm,
  Argent Hotel Pavilion
- Try the Hands-On Lab
  LAB-1506, Fri. 2:30 pm–3:30 pm
- Visit the site, download some code, make a difference!

Compatibility

Superpackages

Beans Binding

Resolution-Independent Graphics

Client Ergonomics

Web Services for JMX

Filesystem API

Docking

Javadoc Tags

Modules

# Dolphin

Tiered Compilation

invokedynamic bytecode

Friends

Tracing

HTML 4.0

BeanShell

Asynchronous I/O

Language-level XML

Stability

Performance

Class-data sharing for applications

Class-loader based application isolation

Method References

Web Services for JMX

Swing Application Framework

# Evolving in the Ecosystem

Our intent

- Compatibility is King

  But we’re not planning on standing still
  - Features for products to enable developers
  - Features for desktop application developers
  - Features that all developers can use

# Dolphin Ideas Are Evolving

- Many, **many** discussions to come

Java
Java Community Process

***many...***

# Language and Languages

## Java Language Changes and Other Language Support

- Language changes
  - Productivity
  - Maintainability
  - Affect developers up the Java technology stack
  - Can be leveraged up the Java technology stack
- Supporting other languages
  - Cater to many niches
  - Great for ‘high-turnover’ applications
  - Crazy things become possible

# Language Changes

## My Picks for Dolphin (Amongst Many Others !)

- Property support
  - Language for `getFoo()/setFoo()` pattern
- Method References
  - `addActionListener(reference updateList)`
- Block Closures
  - Readable statements-within-statements
- Native XML Support
  -

```
elt.add(      <present>
            <who>currentSpeaker</who>
            <day>Calendar.TUESDAY</day>
          </present>);
```

# Dynamic Languages on the JVM software

```
// In Craziscript, grow collection c
getNewSize: c
return c.getSize() * c.getGrowth()
```

```
// interpreted
int getNewSize(Ifc1 c) {
    return (Ifc2)((Ifc1 c).getSize()) *
        (Ifc3)((Ifc1 c).getGrowth());
}
```

# Dolphin Scripting Languages

## Java technology developers and scripting

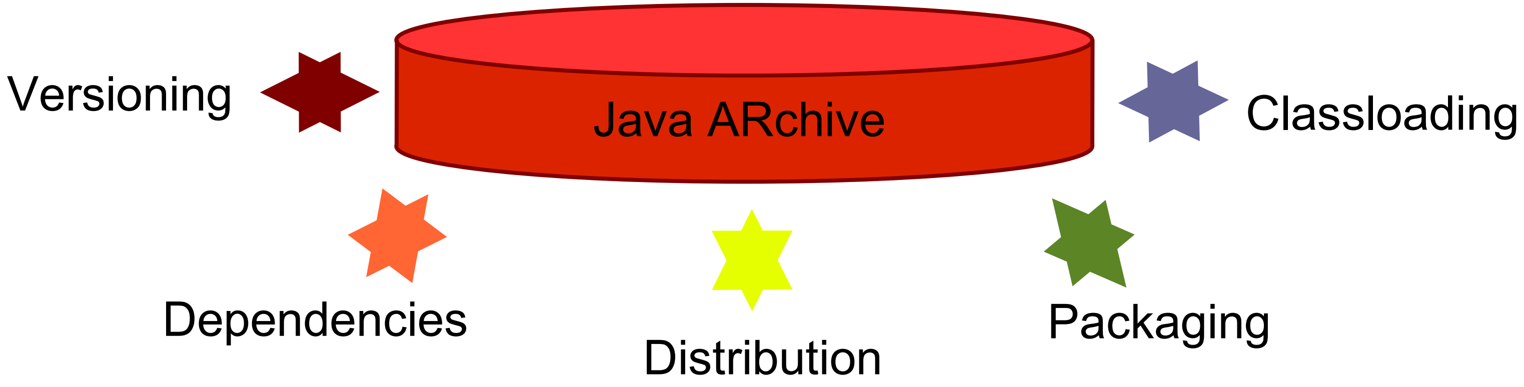
- Turbo-charging scripting engines
  - New bytecode for dynamic method dispatch
  - ‘Supporting Dynamically Typed Languages on the Java Platform’ (JSR 292)
  - Investigate hotswapping
- Bundling more scripting engines
  - ‘The Beanshell Scripting Language’ (JSR 274)
  - beanshell.org

New

TS-3886: Dynamically Typed Languages on... Thur 9:45am

# Dolphin Modules

'super JARs'

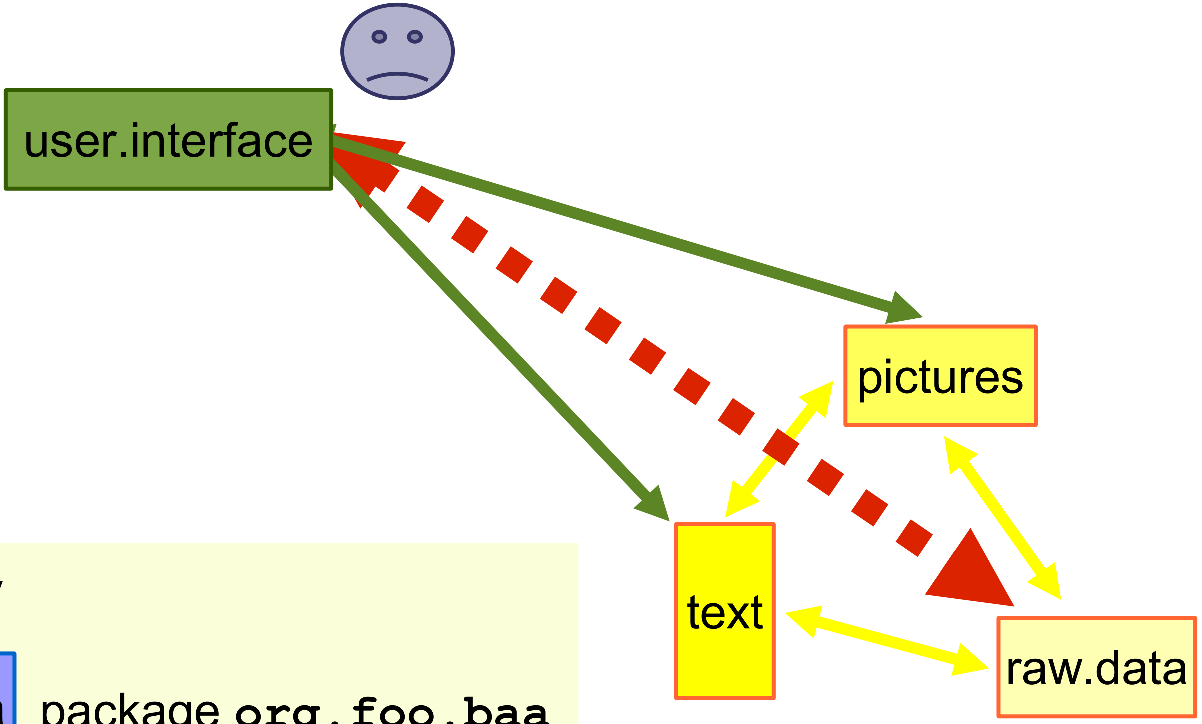


- New deployment and distribution format
  - Friendly to JARs
  - 'Java Module System' (JSR 277)
  - Expect an expert draft soon
- What about at the code level ?

BOF-0684: Java Module System Tue 9:30pm

# Dolphin Modules

‘super packages’



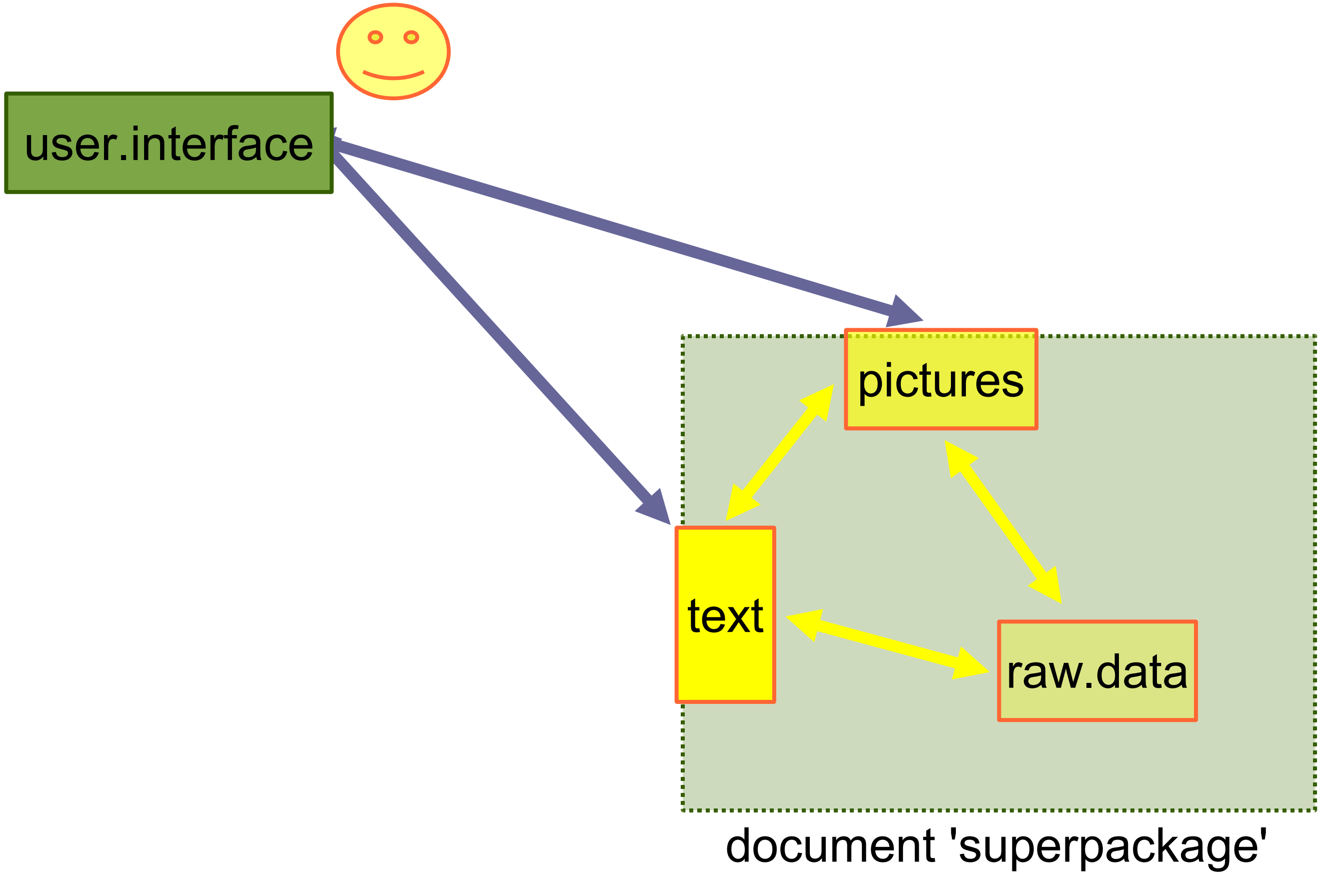
Key

baa package **`org.foo.baa`**

⟷ access to API

# Dolphin Modules

## ‘super packages’



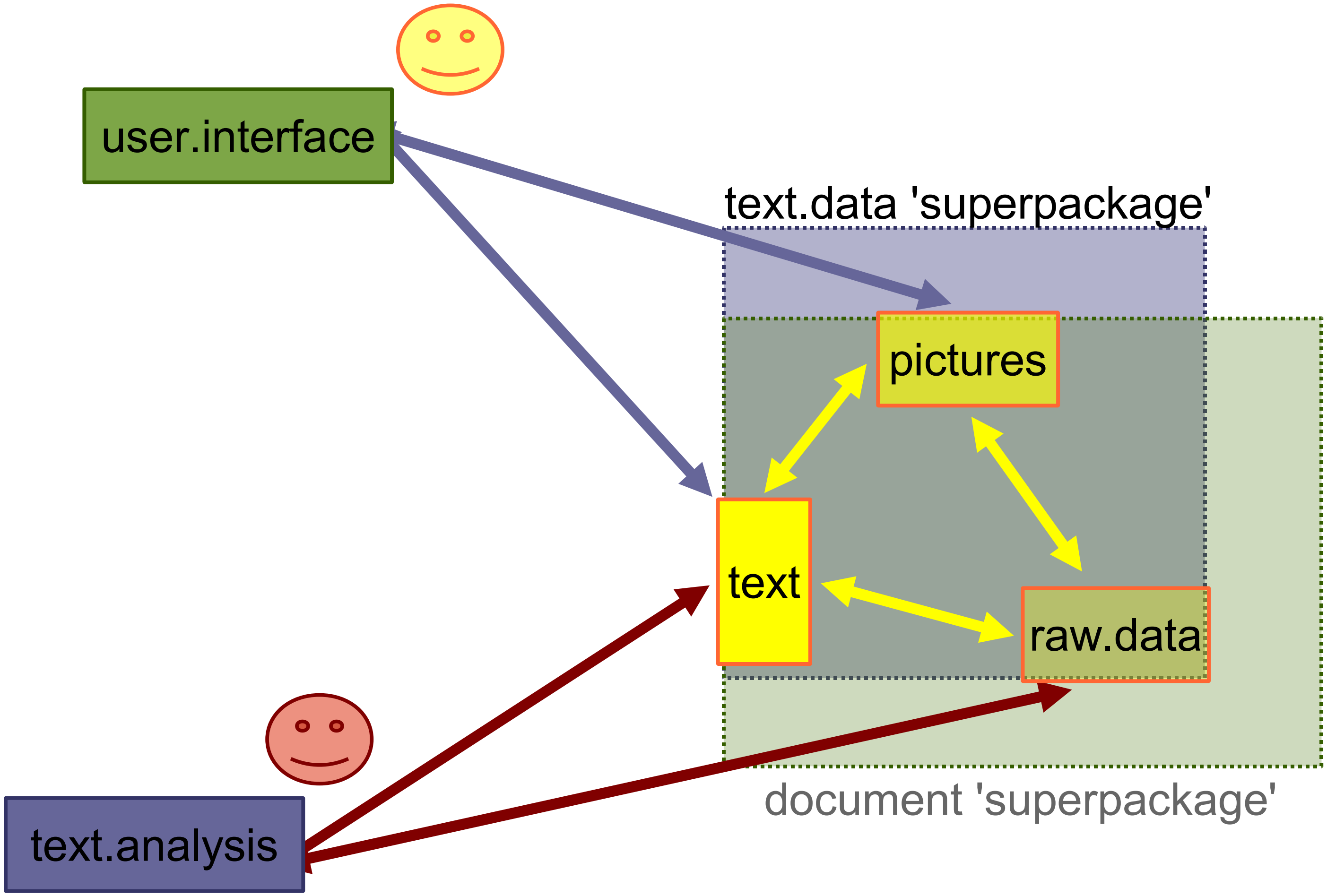
```
super package org.foo.document {

    // super-package exports:
    export org.foo.pictures.MyImageInterface;
    export org.foo.text.*;

    // super-package members:
    org.foo.pictures.MyImageInterface;
    org.foo.text.*
    org.foo.raw.data.*;
}
```

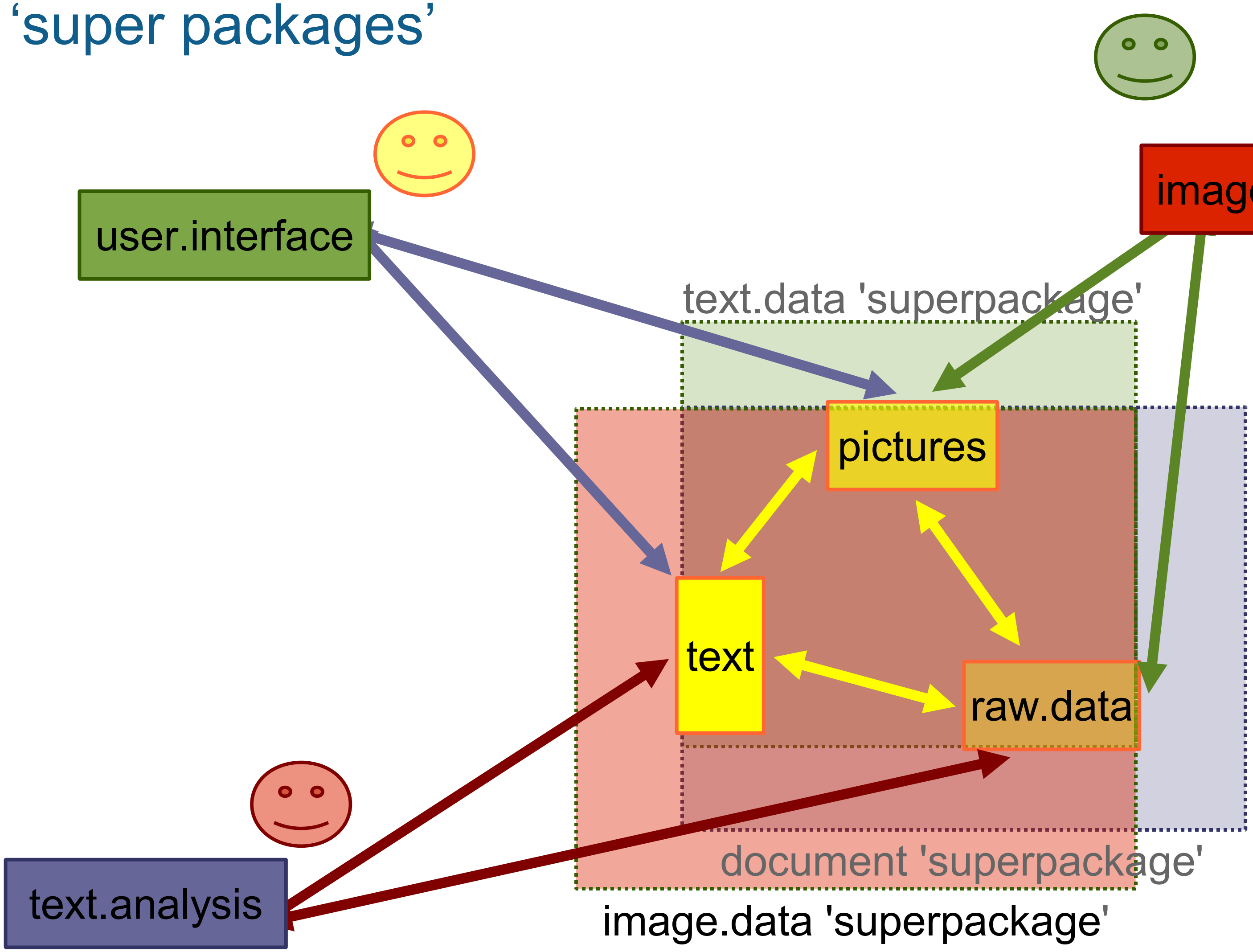
# Dolphin Modules

‘super packages’



# Dolphin Modules

‘super packages’



# Dolphin Application Code Modules

‘superpackages’

- Sharing code in a scalable way
- New ‘superpackage’ syntax
- Extensions to JVM software access control rules
- ‘Improved Modularity Support for the Java Programming Language’ (JSR 292)

New

TS-3885: Superpackages: Development Modules... Wed 12.15pm

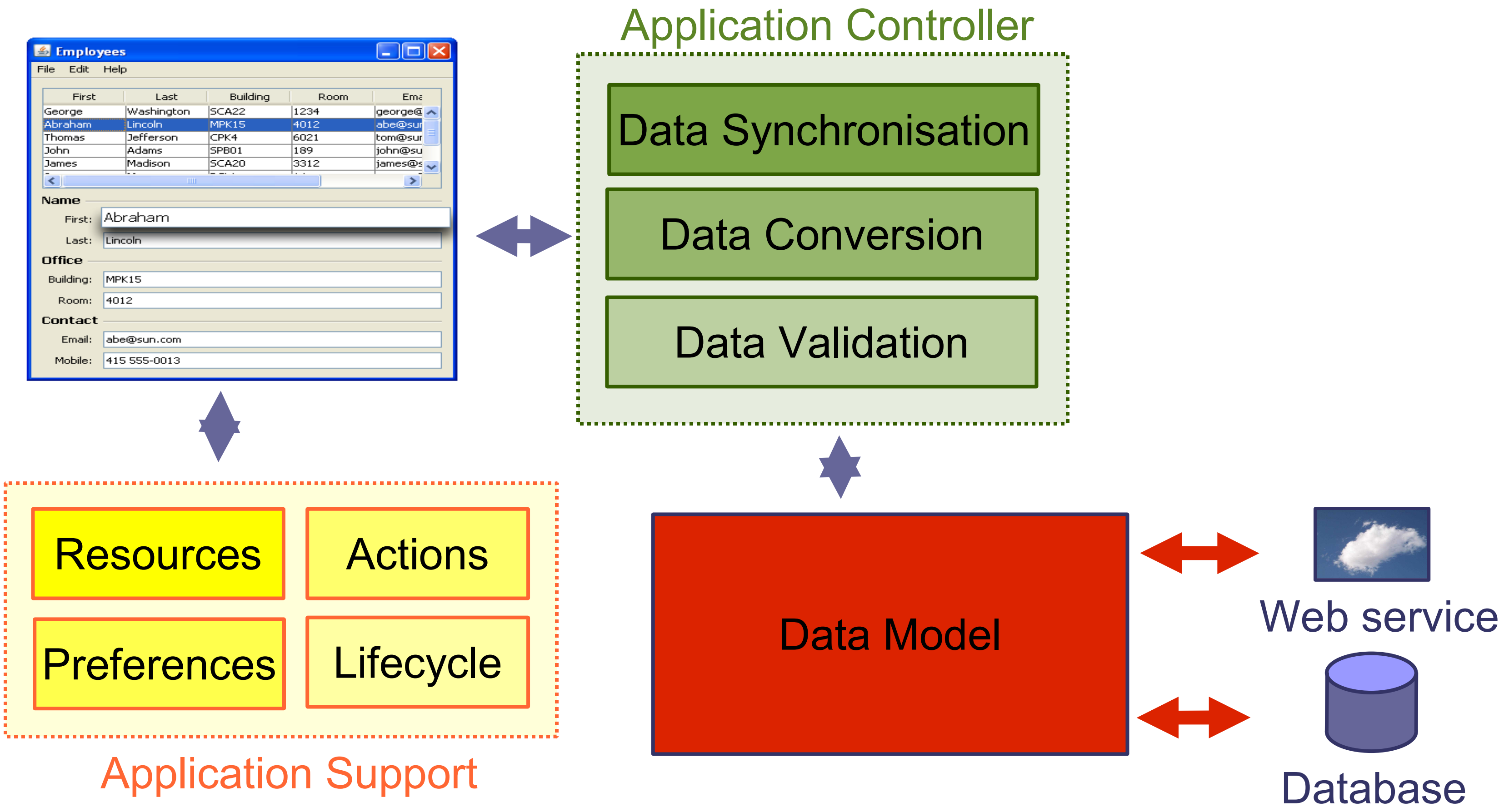
# Desktop Application Development

## Taking Another Look

- Swing is a powerful toolkit
- Some developers are put off
  - “Routine things should be easier”
  - “There’s too much choice”
  - “I end up writing too much code”
  - “It’s difficult to teach”
- EoD is hugely powerful
  - And not just a tools issue

# Simplifying Swing Development

## Anatomy of a Desktop Application



Employees

File Edit Help

| First | Last | Building | Room | Ema |
|---|---|---|---|---|
| George | Washington | SCA22 | 1234 | george@ |
| Abraham | Lincoln | MPK15 | 4012 | abe@sur |
| Thomas | Jefferson | CPK4 | 6021 | tom@sur |
| John | Adams | SPB01 | 189 | john@su |
| James | Madison | SCA20 | 3312 | james@s |

Name

First: Abraham

Last: Lincoln

Office

Building: MPK15

Room: 4012

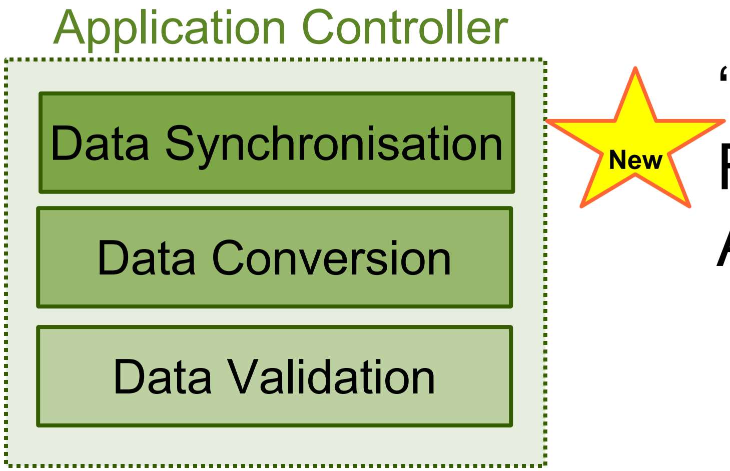
Contact

Email: abe@sun.com

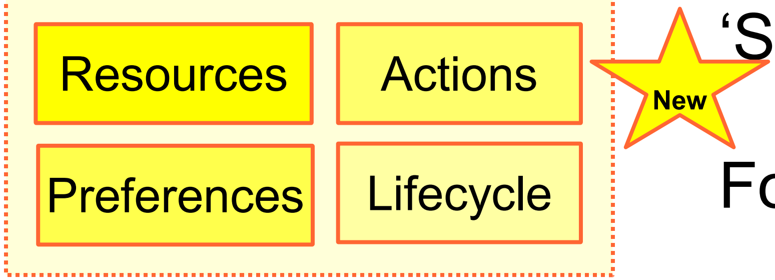
Mobile: 415 555-0013

# Dolphin Swing Development

## Simpler for Fevelopers *and* Tools



‘Beans Binding’ (JSR 295)
Formalizing the Swing Controller
API for connecting JavaBeans™ technology-based beans



‘Swing Application Framework’ (JSR 296)
Formalizing support functions

TS-1594: Best Practices: Data Binding — Wed 4.00 pm
TS-3399: A Simple Framework for Swing... — Thur 4.00pm

# Dolphin Focus Areas

## Three to Remember

- Language and Languages
- ‘Super packages’ and ‘Super JARs’
- Ease of (Desktop) Development

Wait a second, there’s so much more !

# What Haven’t We Mentioned?

- ‘NIO.2’ (JSR 203)
  - Filesystem APIs, asynchronous I/O and more
- ‘Web Services Connector for Java™ Management Extensions (JMX™) Agents’ (JSR 262)
  - Expose JMX agents through web service protocols
- ‘Javadoc™ Tag Technology Update’
  - And update to Java SE platform API documentation
- Accelerated 2D graphics for GUI application rendering
- Incremental enhancements and bugfixes throughout
- ...

# Master Mustang, Develop Dolphin

- Master Mustang
  - Evaluate Beta 2 in June
  - Prepare for October Release

- Learn about Dolphin
  - Help develop Dolphin
  - Join early in the cycle

# Stay in Touch With the Java SE Platform

- JDK Software Community
  - planetjdk.org
  - community.java.net/jdk
- Mustang
  - mustang.dev.java.net
- Dolphin
  - dolphin.dev.java.net
  - blogs.sun.com/dannycoward

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# Your Questions …

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# Mastering Mustang, Developing Dolphin

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