



Java is a trademark of Sun Microsystems, Inc.

JavaOneSM

Seeding the Cloud: Developing Scalable Applications in the Cloud

Ted Leung

Sun Microsystems

Architect, Cloud Developer Tools

Ashwin Rao

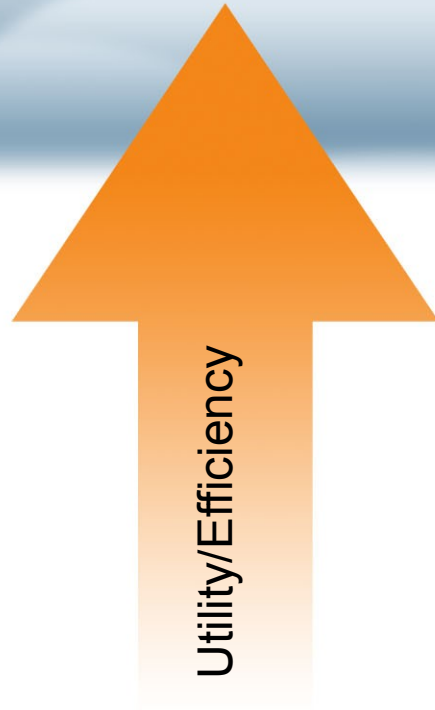
Sun Microsystems

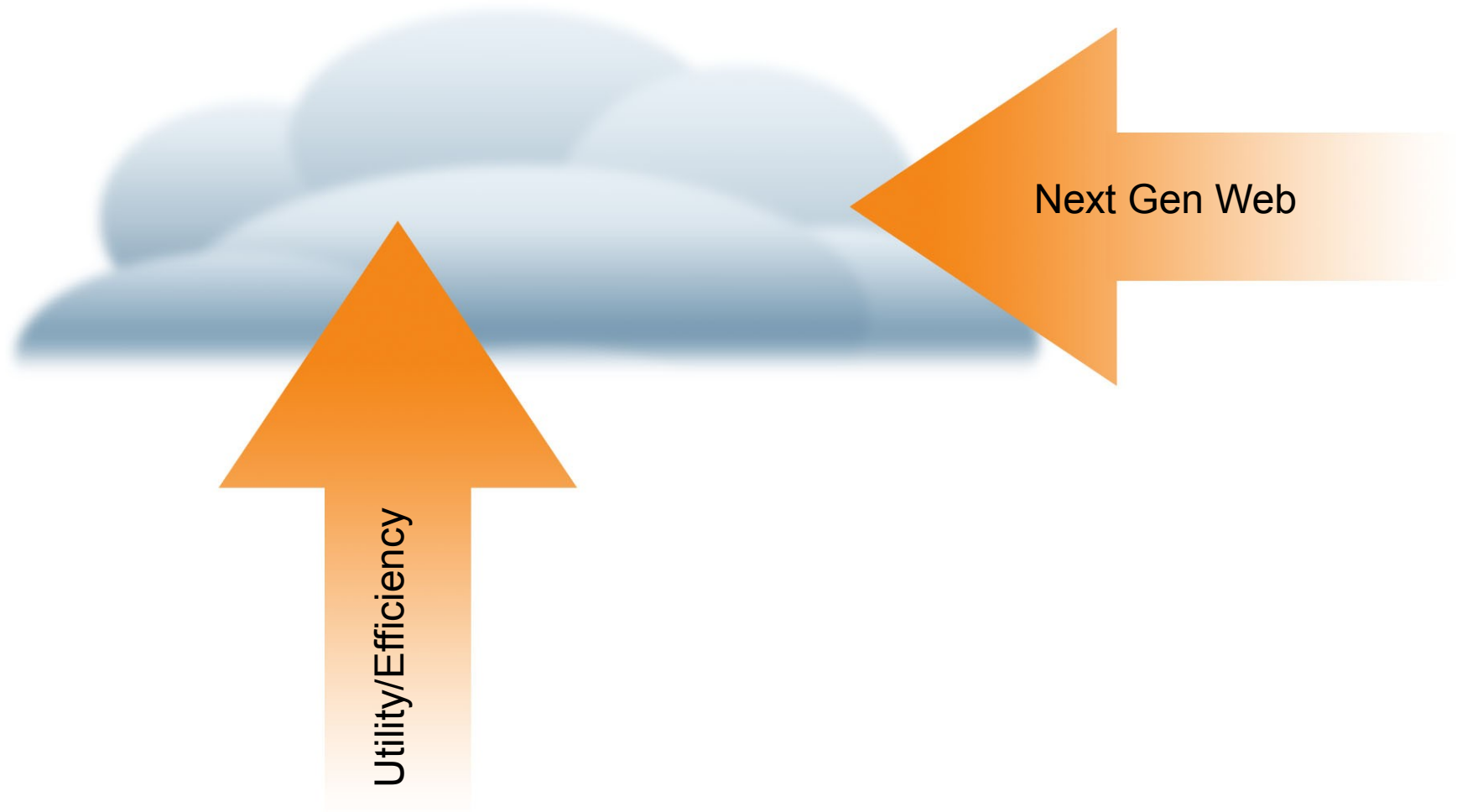
Product Line Manager, Cloud Developer Tools

Agenda

- > **Why the cloud?**
- > What problems will I face?
- > How will my architecture change?
- > What kind of tools are there?
- > Demonstrations
- > What kind of tools do I still need?







The real goal

No fuss, no muss
expansion and contraction

A large, stylized, light blue cloud graphic with soft gradients and rounded edges, positioned in the center of the slide.

Infrastructure aaS

A large, stylized, light blue cloud graphic with soft, rounded edges, serving as a background for the text.

Stack aaS

Infrastructure aaS

A background illustration of several light blue, fluffy clouds of varying sizes and shapes, scattered across the white space.

Platform aaS

Stack aaS

Infrastructure aaS

Software aaS

Platform aaS

Stack aaS

Infrastructure aaS

Software aaS

Platform aaS

Stack aaS

Infrastructure aaS

Storage



Software aaS

Platform aaS

Stack aaS

Infrastructure aaS

Storage

Compute

Software aaS

Platform aaS

Stack aaS

Virtual Machine Images

Infrastructure aaS

Storage

Compute



Software aaS

Platform aaS

AppEngine

Stack aaS

Virtual Machine Images

Infrastructure aaS

Storage

Compute

The diagram consists of several overlapping light blue clouds. The text is arranged in a vertical stack, with each layer's name and examples placed within or near a cloud. An orange lightning bolt connects the Platform aaS layer to the Infrastructure aaS layer.

Software aaS

Platform aaS

AppEngine Heroku

Stack aaS

Virtual Machine Images

Infrastructure aaS

Storage

Compute



Software aaS

Platform aaS

AppEngine

Heroku

Zembly

Stack aaS

Virtual Machine Images

Infrastructure aaS

Storage

Compute



Software aaS

SalesForce

Platform aaS

AppEngine

Heroku

Zembly

Stack aaS

Virtual Machine Images

Infrastructure aaS

Storage

Compute

PaaS in depth

A stylized, light blue cloud graphic with soft, rounded edges, positioned behind the text.

Non Relational DB

A large, light blue, stylized cloud graphic with soft shading and a drop shadow.

Non Relational DB

A smaller, light blue, stylized cloud graphic with soft shading and a drop shadow.

BigTable

A large, light blue, stylized cloud graphic with a soft gradient, serving as a background for the text.

Non Relational DB

A smaller, light blue, stylized cloud graphic with a soft gradient, serving as a background for the text.

BigTable

A smaller, light blue, stylized cloud graphic with a soft gradient, serving as a background for the text.

Key/Value Stores



Non Relational DB

BigTable

Key/Value Stores

CouchDB



Identity

Non Relational DB

BigTable

Key/Value Stores

CouchDB



MapReduce



Identity



Non Relational DB



BigTable



Key/Value Stores




CouchDB



MapReduce



Identity



Asynchronous
Messaging



Non Relational DB



BigTable



Key/Value Stores




CouchDB



MapReduce



Identity



Asynchronous
Messaging



Non Relational DB



XMPP



BigTable



Key/Value Stores




CouchDB



MapReduce



Identity



Asynchronous
Messaging



Non Relational DB



XMPP



Queuing



BigTable



Key/Value Stores



CouchDB

MapReduce

Identity

Asynchronous
Messaging

Non Relational DB

XMPP

Queuing

BigTable

Key/Value Stores

CouchDB

Payments

Agenda

- > Why the cloud?
- > **What problems will I face?**
- > How will my architecture change?
- > What kind of tools are there?
- > Demonstrations
- > What kind of tools do I still need?

What are the problems?

- > Latency
- > Development / deployment more deeply entwined
- > Security requires more thought since you are constrained by your vendor
- > Audit / Regulatory issues
- > Single source provider

What are the problems? IaaS

- > VMI Management
- > Security
- > Must handle app level scaling
- > Must deal with network architecture
- > Tools stop at the infrastructure level
 - Stuff like deploy to cloud has no meaning

What are the problems? Stack aaS

- > Limits on the stack
- > Verified/authentic/expertly configured stacks
- > Must handle app level scaling
- > Must deal with network architecture
- > Tools are available, but stack specific, functionality varies widely

What are the problems? PaaS

- > Constrained by platform choices
 - Class whitelists
 - Services available
- > Development vs deployment environment

What are the problems? SaaS

- > May not be developer enabled at all
- > Proprietary technologies to learn
 - Salesforce Apex

Agenda

- > Why the cloud?
- > What problems will I face?
- > **How will my architecture change?**
- > What kind of tools are there?
- > Demonstrations
- > What kind of tools do I still need?

What are the architectural considerations?

- > Latency
- > Use of storage
- > Use of services
- > Heterogeneity
- > QA/Staging Environments
- > Applications need to be able to deal with dynamic (de)allocation of services/machines/resources

Asynchronous architectures

- > Applications will be broken up into services
- > Applications will rely more on asynchrony and queues
- > Pipelines as an architecture
 - Indexing
 - Transcoding
- > Background processing
 - Logging / Audit
- > Know the behavior of vendors services, messaging

Architecture: IaaS

- > Ability to control via API's
 - Essential for self automation, scaling, etc
 - Are those API's standardized?
- > Dynamic configuration

Architecture: Stack aaS

- > API control
- > Dynamic configuration

Architecture: PaaS

- > API access to monitoring data
- > Specific to each PaaS implementation
 - Based on the characteristics of vendor choices
 - SimpleDB vs AppEngine datastore vs Cassandra vs CouchDB
 - AppEngine restrictions
- > Platform may only be suited for certain kinds of applications

Architecture: PaaS: Messaging

- > Used to connect to services
- > Looser coupling between systems
 - Improves availability, manageability
- > Lots of advanced strategies for using messaging
 - Control of priority
 - Admission (retry) control
- > Technologies
 - AMQP, SQS

Architecture: PaaS: Non-relational stores

- > High write volumes
- > Eventual consistency
- > Non ACID semantics
- > Queries not based on SQL
- > Simple schemas or key-value storage models
- > Technologies
 - SimpleDB, Cassandra, CouchDB, Tokyo Tyrant, many others

Architecture: PaaS: MapReduce

- > Use for processing high volumes of data
- > Very useful for background processing
 - Logs, audit info
- > Can be done on database extracts
- > Technologies
 - Hadoop, Disco

Architecture: SaaS

- > Specific to each SaaS implementation
 - Salesforce Apex resource limiting

Agenda

- > Why the cloud?
- > What problems will I face?
- > How will my architecture change?
- > **What kind of tools are there?**
- > Demonstrations
- > What kind of tools do I still need?

What kind of tooling is available?

- > Develop “with” the Cloud
 - Amazon Web Services Toolkit for Eclipse
 - G-Eclipse
 - Project Speedway

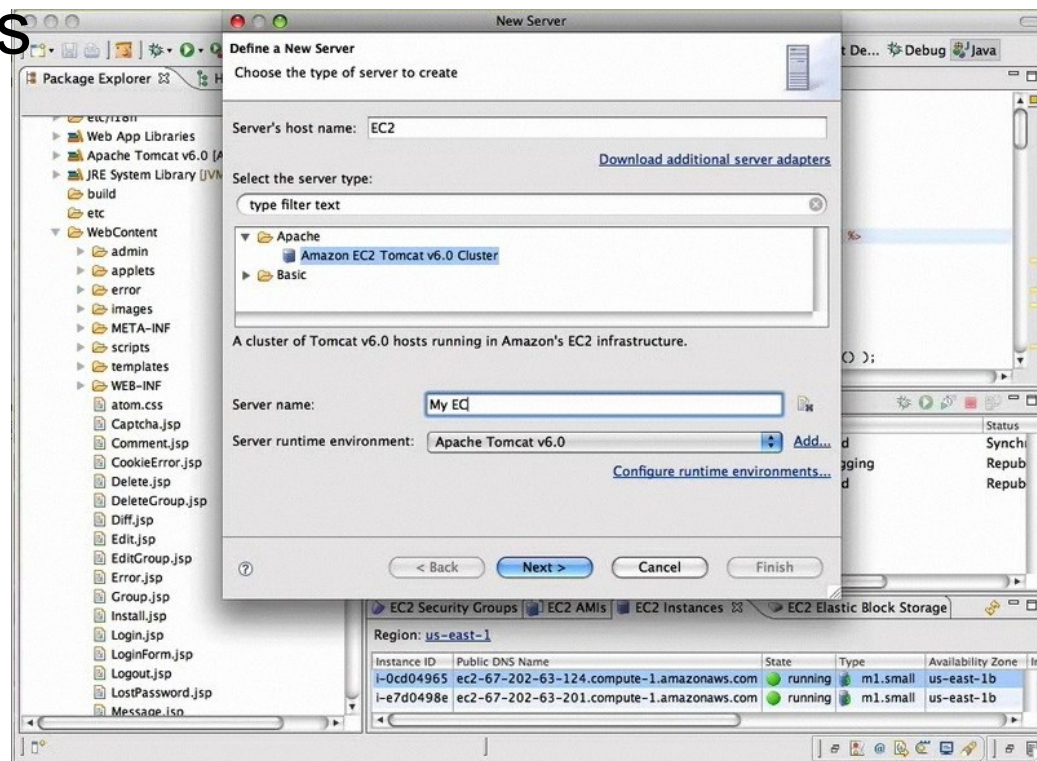


Stack aaS

Infrastructure aaS

Develop “With” The Cloud

- > Amazon Web Services Toolkit for Eclipse
 - Extends the Web Tools Platform
 - Deploy, Run and debug against Amazon EC2 Compute Cluster
 - Perform basic EC2 Management Tasks



Types of Tooling available

> Develop “for” the Cloud

- Google App Engine SDK
- Windows Azure Tools for Microsoft Visual Studio
- Force.com IDE
- Aptana Studio
- WaveMaker Cloud Studio



Platform aaS

The diagram illustrates the layers of cloud computing using stylized clouds. Three distinct cloud shapes are arranged in a horizontal line, representing the layers of abstraction. The top cloud is labeled 'Platform aaS', the middle cloud is labeled 'Stack aaS', and the bottom cloud is labeled 'Infrastructure aaS'.

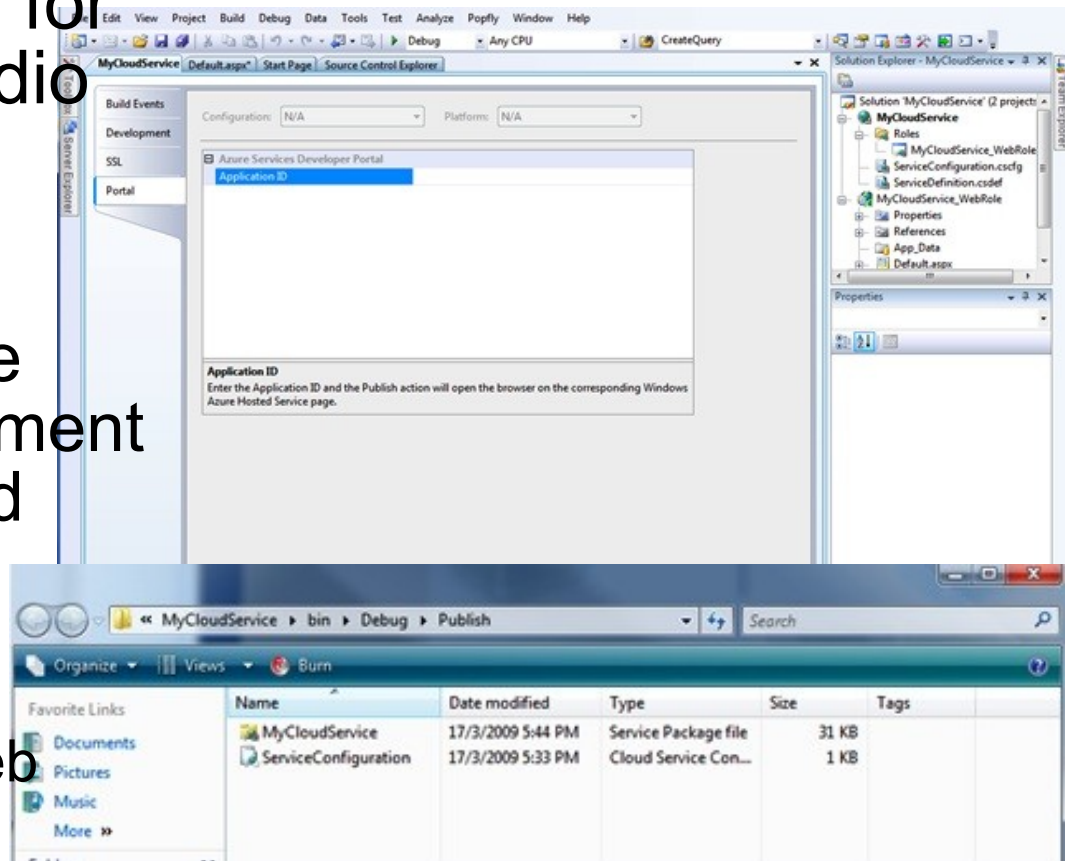
Stack aaS

Infrastructure aaS

Develop “For” The Cloud

> Windows Azure Tools for Microsoft Visual Studio

- Plugin for Microsoft Visual Studio
- Provides a complete simulation environment for the Azure Cloud platform
- Deploy to the Cloud
 - Windows Azure Web Portal



Types of Tooling available

> Develop “in” the Cloud

- Force.com Builder
- Bungee Connect
- Project Speedway
- Zembly

Development aaS

Software aaS

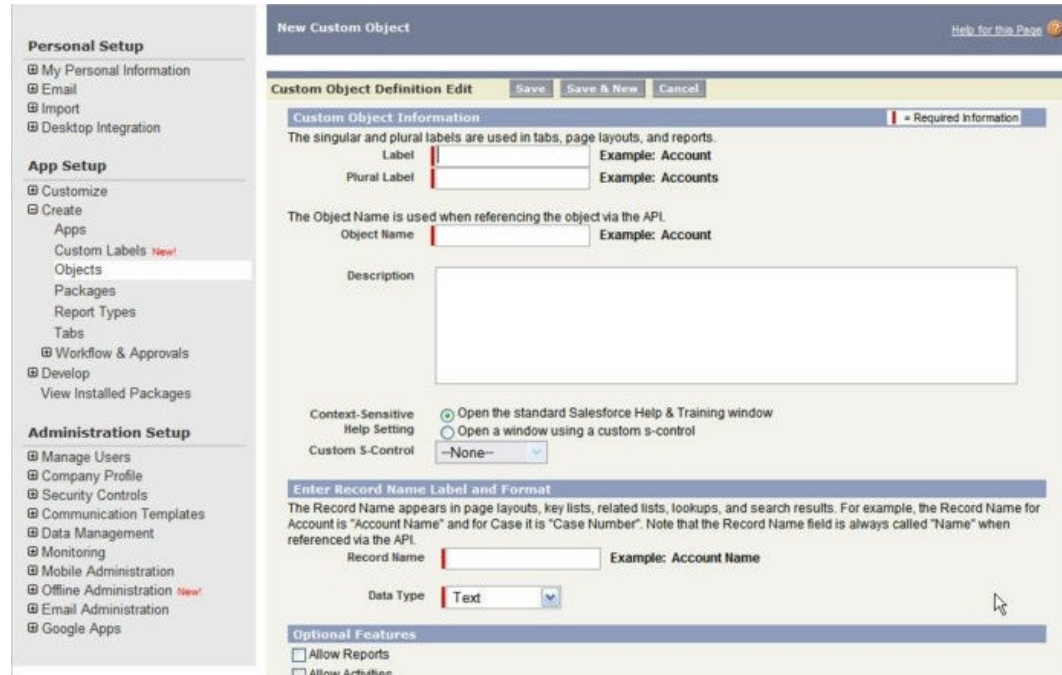
Platform aaS

Stack aaS

Infrastructure aaS

Develop “In” The Cloud

- > Force.com Developer Edition
 - Develop and test software as a service applications in the cloud
 - Seamlessly deploy to servers on the cloud



The screenshot displays the 'New Custom Object' configuration page in the Force.com Developer Edition. The left sidebar contains navigation menus for 'Personal Setup', 'App Setup', and 'Administration Setup'. The 'App Setup' menu is expanded, showing options like 'Customize', 'Create', 'Workflow & Approvals', and 'Develop'. The main content area is titled 'New Custom Object' and includes a 'Custom Object Definition Edit' section with fields for 'Label', 'Plural Label', 'Object Name', and 'Description'. Below this is a 'Context-Sensitive Help Setting' section with radio buttons for 'Open the standard Salesforce Help & Training window' and 'Open a window using a custom s-control'. The 'Custom S-Control' dropdown is set to '--None--'. The 'Enter Record Name Label and Format' section includes a 'Record Name' field and a 'Data Type' dropdown set to 'Text'. At the bottom, the 'Optional Features' section has checkboxes for 'Allow Reports' and 'Allow Activities'.

Sun's “Connected” Cloud Developer Components

> Kenai

- Cloud-centric software project management tool
- Set of RESTful web services: Source Code Management, Wiki, Issue Tracking, Forums, Instant Messaging, Downloads

> Project Speedway

- Build, test and debug in the cloud for C, C++ and FORTRAN apps
- Access powerful SPARC processor based systems in the Cloud

> Zembly

- Cloud-based, easy-to-use tool for social networking apps; enables developers to connect services to create applications
- Web API gateway allows connection of services in the Cloud

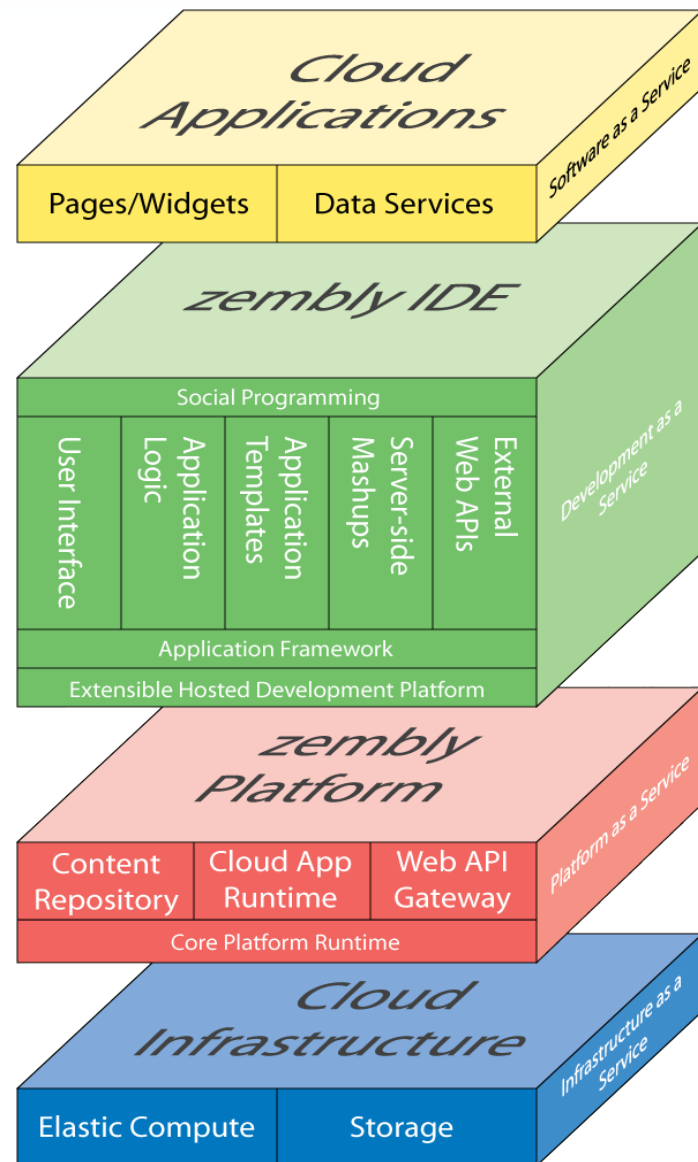
> O'Malley

- A catalog of self-published software from partners and Sun for the Sun Cloud
- Software can be fully configured virtual machine images or applications

What is Zembly?

- > zembly is Development as a Service (DaaS)
 - Hosted, Extensible IDE
 - Developer platform
- > zembly is Platform as a Service (PaaS)
 - Web APIs
- > zembly enables Web Oriented Architecture(WOA) using the zembly application model

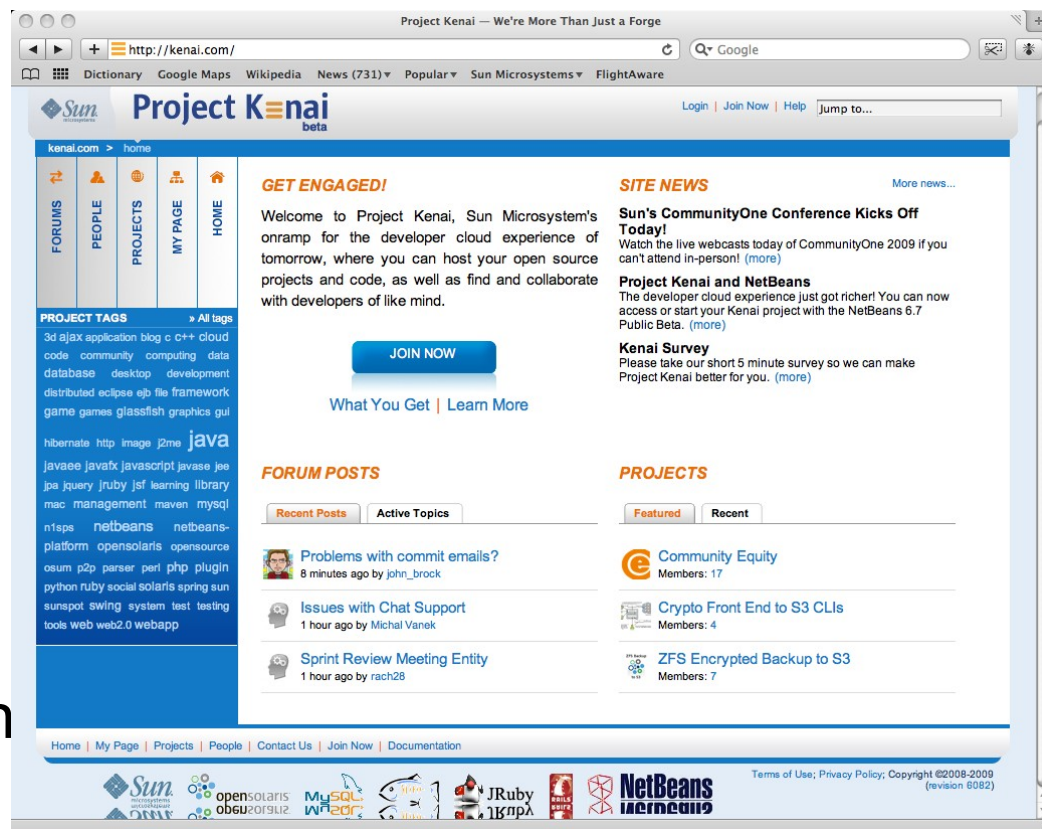
<http://zembly.com>



Learn more at booth #312C

What is Kenai?

- > Provide a set of core services to be used by developers to build their applications in the cloud
- > Provide value-added developer services from the web/Cloud
 - RESTful Web Service APIs
 - Continuous integration
 - Code performance, analysis and tuning



<http://kenai.com>

Learn more at booth #312B

What is Project Speedway?

- > **Universal access** – via a host-independent browser interface or IDE - NetBeans
- > **Minimal setup** – Fully configured OpenSolaris Desktop in the cloud; Supports the entire Sun Studio tool chain
- > **Develop, build, test applications** – Build, Test, Debug, Tune, Analyze, Package, C & C++ and Fortran applications in the Cloud

Project Speedway provides developers universal access to OpenSolaris on SPARC processor based Sun systems that need minimal setup, to enable creation of efficient and scalable applications in the cloud

<http://developers.sun.com/speedway>

Agenda

- > Why the cloud?
- > What problems will I face?
- > How will my architecture change?
- > What kind of tools are there?
- > **Demonstrations**
- > What kind of tools do I still need?

Demonstrations

- > Netbeans + Kenai (Sun Cloud Portal)
- > Speedway
- > Cloud Web UI testing

Agenda

- > Why the cloud?
- > What problems will I face?
- > How will my architecture change?
- > What kind of tools are there?
- > Demonstrations
- > **What kind of tools do I still need?**

What's next for tools?

- > Service use/construction
- > Tools to help deal with the scope/scale of the system
- > Tools integrated with the cloud itself
- > Tools that use the cloud as a tool

The Cloud as a tool

- > Web based IDE's
- > Apply elastic computing capacity to developer problems
 - Continuous Integration
 - Web UI testing
 - Multiplatform testing
 - Scalability testing

Tools: IaaS

- > Cluster level management
- > Network management

Tools: Stack aaS

- > Clustered application management / deploy?
- > Monitoring

Tools: PaaS

- > Monitoring
- > On/off platform (web) development
- > Service based application construction

Tools: SaaS

- > Tools are provided by the vendor
 - Force.com IDE
- > API access might allow constructing tools

For more information

> The Sun Cloud

- <http://sun.com/cloud>

> NetBeans™

- <http://netbeans.org>

> Zembly

- <http://www.zembly.com>

> Project Speedway

- <http://developers.sun.com/speedway>

> Windmill

- <http://www.getwindmill.com>

Thanks

- > Ted Leung
 - ted.leung@sun.com
 - <http://www.sauria.com/blog>
 - @twleung
- > Ashwin Rao
 - ashwin.rao@sun.com