

# Sakai Architecture and Roadmap

Charles Severance

[www.sakaiproject.org](http://www.sakaiproject.org)

[csev@umich.edu](mailto:csev@umich.edu)

境

KYOU / sakai

Boundary, Situation



# It takes a village to build a CLE....

QuickTime™ and a YUV420 codec decompressor are needed to see this picture.

QuickTime™ and a YUV420 codec decompressor are needed to see this picture.

QuickTime™ and a TIFF (Uncompressed) decompressor are needed to see this picture.

QuickTime™ and a TIFF (Uncompressed) decompressor are needed to see this picture.

QuickTime™ and a compressed decompressor are needed to see this picture.

QuickTime™ and a TIFF (Uncompressed) decompressor are needed to see this picture.

QuickTime™ and a TIFF (Uncompressed) decompressor are needed to see this picture.

QuickTime™ and a TIFF (LZW) decompressor are needed to see this picture.

QuickTime™ and a TIFF (Uncompressed) decompressor are needed to see this picture.

QuickTime™ and a TIFF (Uncompressed) decompressor are needed to see this picture.

QuickTime™ and a TIFF (Uncompressed) decompressor are needed to see this picture.

QuickTime™ and a TIFF (Uncompressed) decompressor are needed to see this picture.

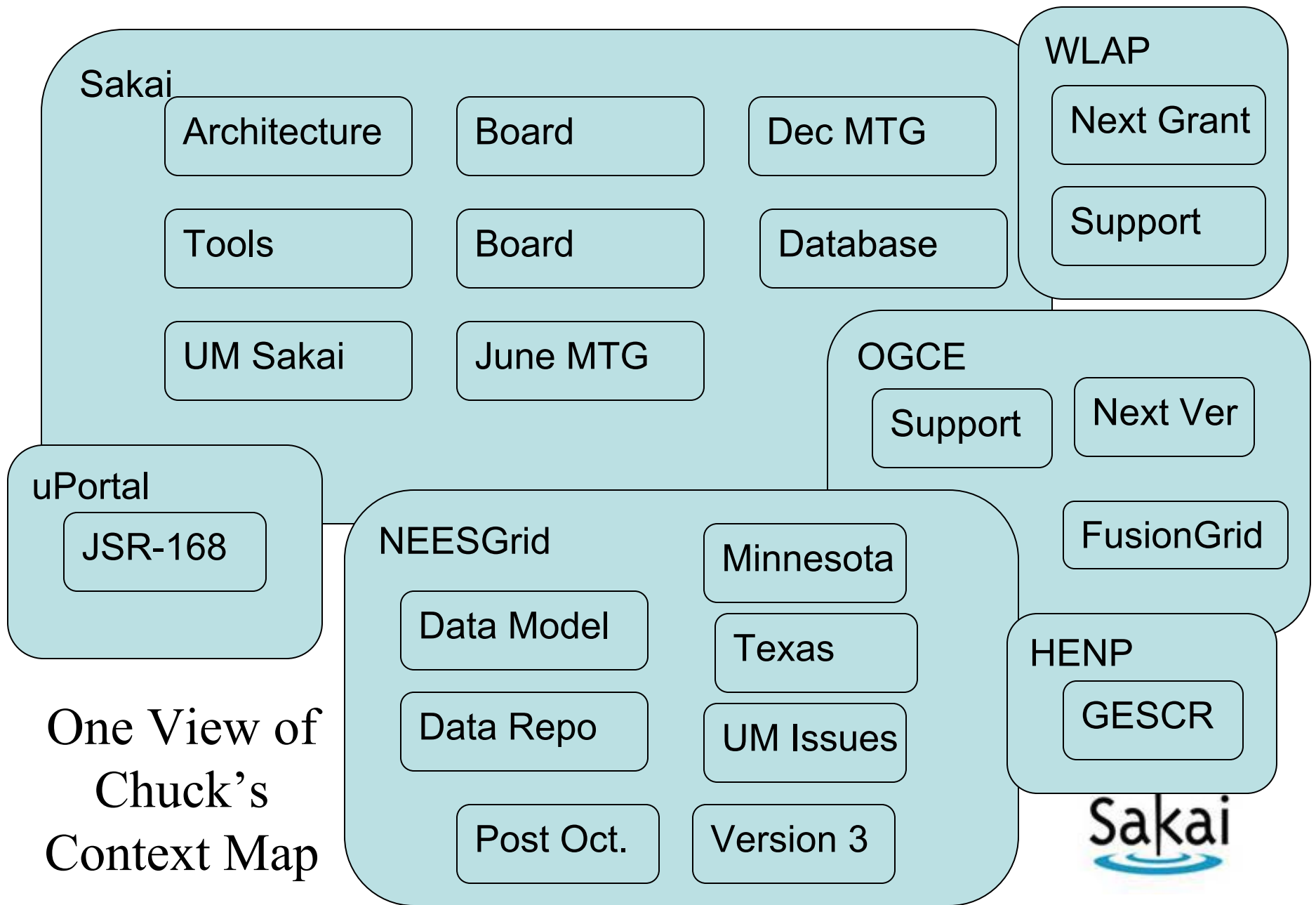
QuickTime™ and a TIFF (Uncompressed) decompressor are needed to see this picture.



sh **Photo blog: [www.dr-chuck.com](http://www.dr-chuck.com)**

# Collaboration Happens

- As individuals, we are parts of many groups and have many roles in those groups



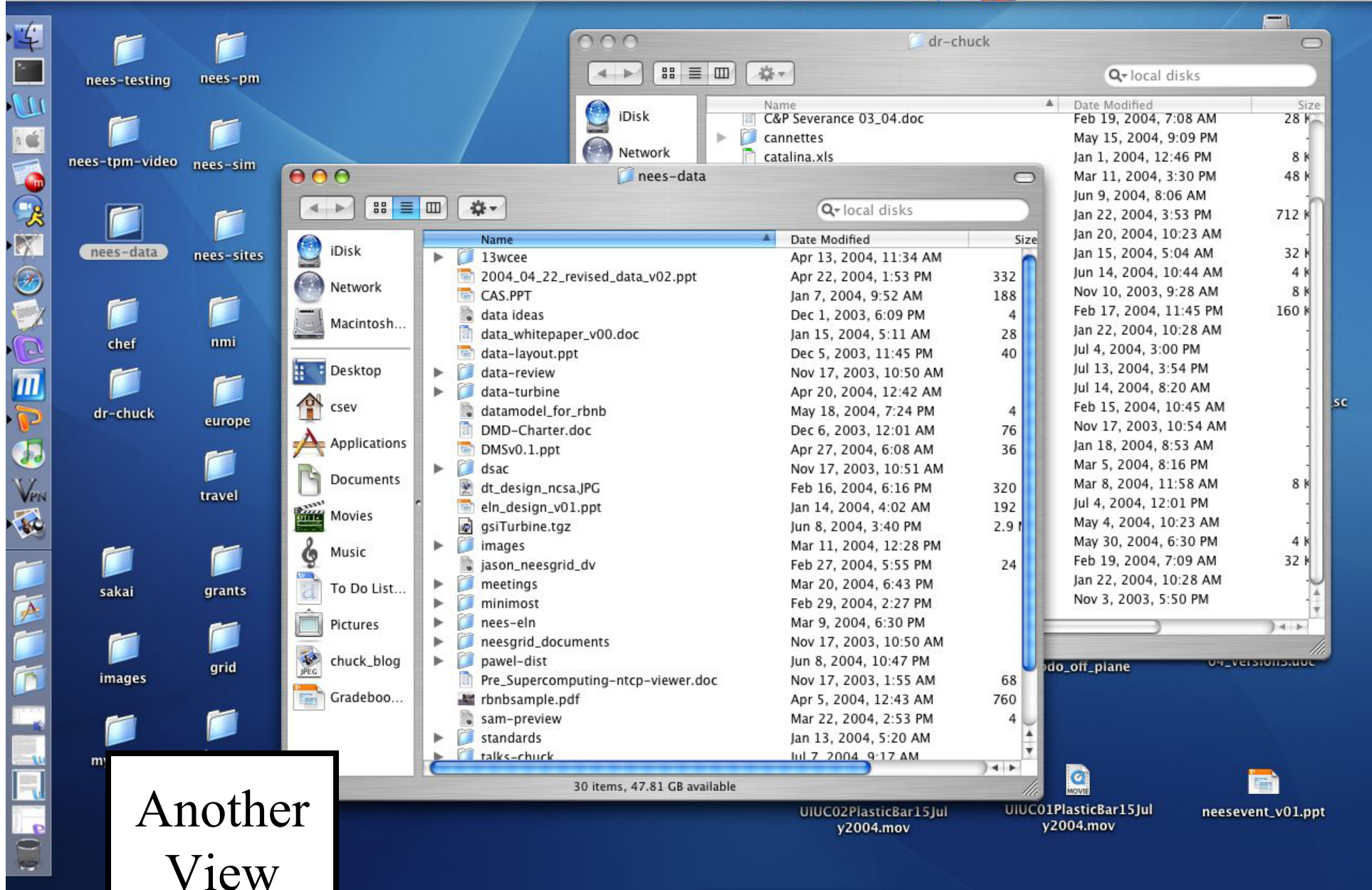
- nees
  - nees-arch
  - nees-cert
  - nees-chef
  - nees-compsim
  - nees-cvs
  - nees-data
    - nees-curation
    - nees-data-antelope
    - nees-data-model
    - nees-data-projbrowse
    - nees-data-srb
    - nees-data-turbine
    - nees-data-viewer
    - nees-dv
    - nees-jdr
  - nees-demos
    - nees-demo-13wcee
    - nees-demo-congress
    - nees-demo-rpi
    - nees-demo-sandiego
  - nees-discuss
  - nees-documentation
  - nees-ebd
  - nees-eln

- nees-meetings
  - 04-01-sitevisit
  - 04-02-urbana
  - 04-03-awardees
  - 04-03-creare
  - 04-03-curation
  - 04-04-japan
  - 04-04-sandiego
  - 04-05-sandiego
  - 04-06-nsfmi
  - 04-07-japan-dc
  - 04-08-canada
- nees-minimost
- nees-neesevent
- nees-nsf
- nees-ntcp
- nees-papers
- nees-sdsc
- nees-sim
- nees-sites
  - minnesota
  - texas
  - ucdavis
  - ucla
- nees-testing
- nees-time
- nees-tpm
- nees-training
- nees-transistion
- nees-ucb

- neon
- nmi
  - nmi-dev
  - nmi-grid-portal.mailbox
  - nmi-gridport
  - nmi-gridsphere
  - nmi-nsf
  - nmi-support
- sakai
  - sakai-accessibility
  - sakai-arch
  - sakai-authz
  - sakai-board
  - sakai-bugs
  - sakai-commercial
  - sakai-content
  - sakai-cvs
  - sakai-db
  - sakai-dev
  - sakai-docs
  - sakai-eclipse
  - sakai-exo
  - sakai-friends
  - sakai-gradebook
  - sakai-gui
  - sakai-i18n
  - sakai-ims
  - sakai-input
  - sakai-japan
  - sakai-jboss

- sakai-jisc
- sakai-jsf
- sakai-jxf
- sakai-kb
- sakai-meetings
  - 04-01-southafrica
  - 04-02-iu
  - 04-02-stanford
  - 04-02-uk
  - 04-03-de-uk
  - 04-03-mit
  - 04-03-nyc
  - 04-03-umich
  - 04-04-umich
  - 04-05-oki-boston
  - 04-06-ch
  - 04-06-sepp
  - 04-06-uportal
  - 04-07-italy
  - 04-11-orlando
- sakai-navigo
- sakai-oki
- sakai-papers
- sakai-perf
- sakai-pm
- sakai-presentation
- sakai-press
- sakai-rdf
- sakai-sepp
- sakai-sites

Another  
View



Another View

# Maintaining the Map

- Read E-Mail and move to proper folders
- Copy attachments into folders
- Searching for information
- Making calendar entries from E-Mail



# Imagine Software

- That could create a new “context” in a few clicks
  - Enroll/invite others to the context as necessary in a few more clicks
- Context capabilities
  - E-Mail list (automatically extracts attachments and places them in folders which appear on your desktop)
  - Schedule (you can either see a “federated” schedule across all contexts or look at one context)
  - Persistent browser-based chat - quite useful during meetings when the Polycom or VRVS messes up :)
  - Resource area where anyone can upload files which appear on everyone’s desktop at the same time (WebDAV)
  - Threaded discussion area for the context
- Problem: There are literally hundreds of solutions to portions of this problem.



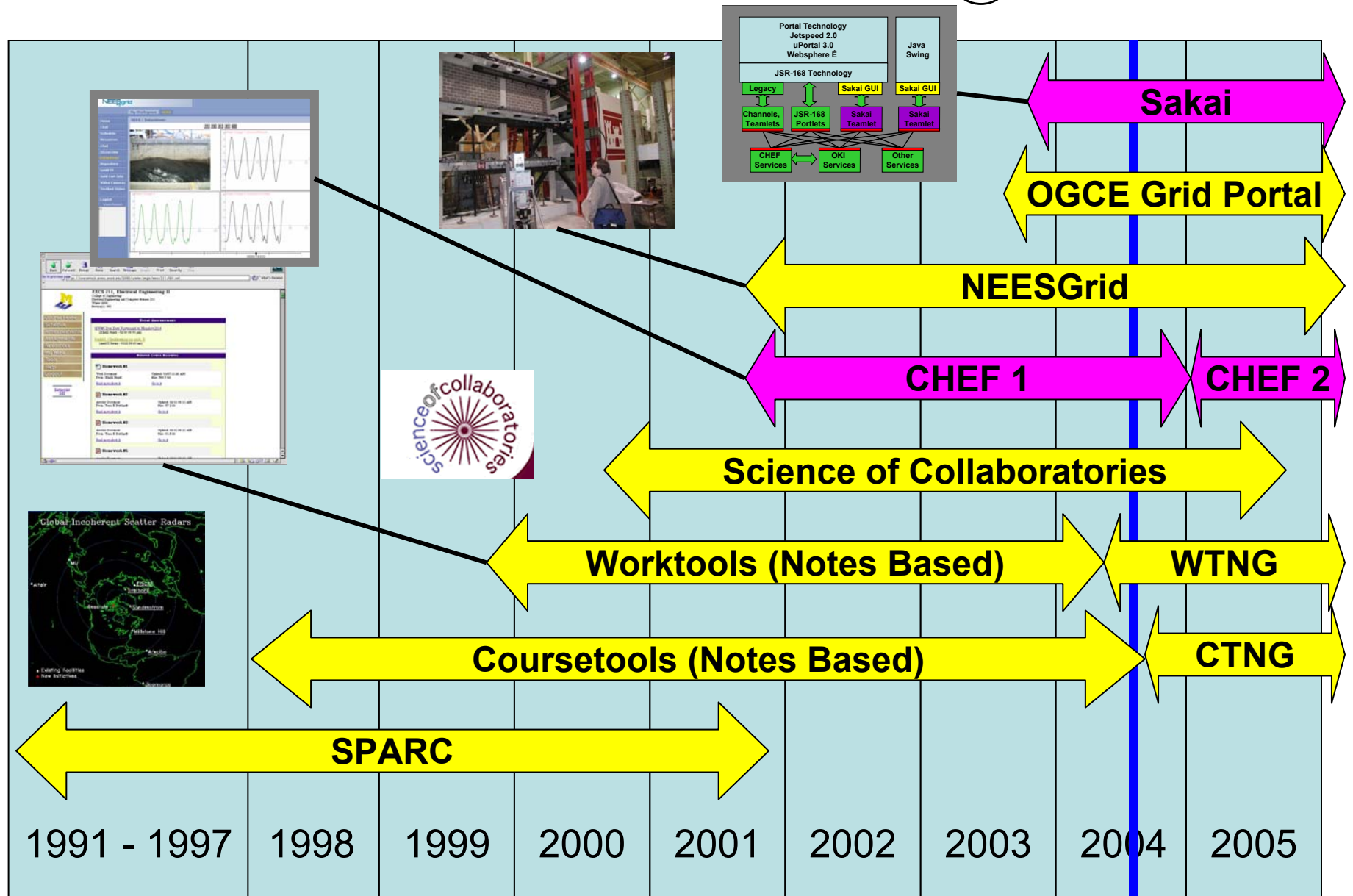


# More Software

- A single place to see new activity in your “contexts”
- These contexts are stored on backed-up production servers rather than your desktop for many years
- A search across your contexts - that would be really cool
- The ability to customize each context in terms of look, feel, and capabilities
- The ability to build unique domain specific tools and interfaces to extend the mechanism using Portlets, Servlets, or Applets



# A 10-Year Collaborative Mission @ UM



### SPARC - Netscape

18:36:50 GMT  
SPARC  
Incech atSRP

**Velocities**  
[East Coast](#)  
[ISR Density & Velocity](#)  
[ISR Data Availability](#)  
[Demo: Live Video](#)  
[Sondre Mag, NBR, IRIS](#)

**User list:**  
[Alan Burns](#)  
[Jeff Thayer](#)  
[Jon Andersen](#)  
[Tony van Eyken](#)  
[Ennio R. Sanchez](#)

Chat: Send Clear

1999/05/05 18:13:32 - Ennio R. Sanchez: There has been a steep increase in the >10 MeV proton flux (factor of 4 in just 1 hour) starting at ~1600 UT. Possibly a precursor to the arrival of the high speed stream, or another structure that could be seen by ACE soon.

1999/05/05 18:12:05 - Glenn R. Golden: Tony - good! That or a page refresh should recover from the problem. We are working on figuring out what is going wrong... And we also have seen a problem with Chat not being updated, which we are also working on (that will be easier to fix.)

1999/05/05 18:10:44 - Tony van Eyken: However, I still have to reload the chat box (sometimes), even though the time is updating up there.

1999/05/05 18:09:19 - Tony van Eyken: Well I reloaded the

http://srr.sri.com/home/paceweather/current/main.html

**(99/05/05 15:45 UT)**

**A Shock Has Been Detected by ACE at 15 UT Today, 99/05/05**

**Initial effects of the solar disturbance should be seen at Earth at ~16 UT. Compression Effects are Apparent in the GOES Satellites Magnetic Field Measurements**

**LATEST DEVELOPMENTS**

ACE RTSW (Estimated) MAG & SWEPAM

Estimated Kp

ACE Satellite Magnetometer

prediction of Neutral Temperature

Pressure Level = 1.0

prediction of Electron Density

UT = 16h 00m Pressure Level = 1.0

### Sondre Real Time - Netscape

18:36:50 GMT -- Sondre Real Time -- Joseph atSEB

Sondrestrom Magnetometer

Sondrestrom Normal Beam Riometer

Sondrestrom Iris Image

Document: Done

2/2001 600 users 800 data sources

Start SPARC - Net... ISR: Millston... TINGModel... Demo: TING... Netscape... ISR: Tromso... SPARC... Sondre Real... ISR: Sondre2... Microsoft Po... Demo: Live V... RealPlayer: 5... 2:12 PM


Netscape: EECS 211, Electrical Engineering II

Back Forward Reload Home Search My Images Print Security Stop

Go to previous page ps://coursetools.ummu.umich.edu/2000/winter/engin/eecs/211/001.nsf What's Related

## EECS 211, Electrical Engineering II

College of Engineering  
Electrical Engineering and Computer Science 211  
Winter 2000  
Section(s): 001



- Course Home
- Schedule
- Announcements
- Assignments
- Resources
- My Work
- Tools
- Help
- Logout

[Engineering](#)  
[U-M](#)

### Recent Announcements

[HW#5 Due Date Postponed to Monday 2/14](#)  
(Khalil Najafi - 02/10 08:39 pm)

[Prelab1: Clarifications on prob. 5](#)  
(Axel D Berny - 01/22 09:03 am)

### Selected Course Resources

**Homework #1**

Word Document Updated: 01/07 11:26 AM  
From: Khalil Najafi Size: 560.5 kb

[Read more about it](#) [Go to it](#)

**Homework #2**

Acrobat Document Updated: 02/11 08:11 AM  
From: Trasa R Burkhardt Size: 87.1 kb

[Read more about it](#) [Go to it](#)

**Homework #3**

Acrobat Document Updated: 02/11 08:12 AM  
From: Trasa R Burkhardt Size: 61.8 kb

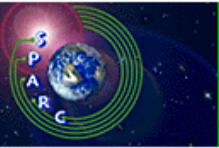
Over 42,000 users at the end of 2003

CHEF Site - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites History Print Copy Paste

Address <https://worktools.si.umich.edu/workspaces/jhardin/005.nsf?opendatabase> Go Links >>



# WORKSHOP resources

By Folder | [By Name...](#) | [By type...](#) | [By date modified...](#) | [Search](#)

Home  
Schedule  
Announcements  
Tasks  
Resources  
Discussion  
My Work  
Tools  
Administration  
Help  
Logout

[U-M](#)  
[WTools](#)  
[my workspace](#)

**Current Folder**

Resources

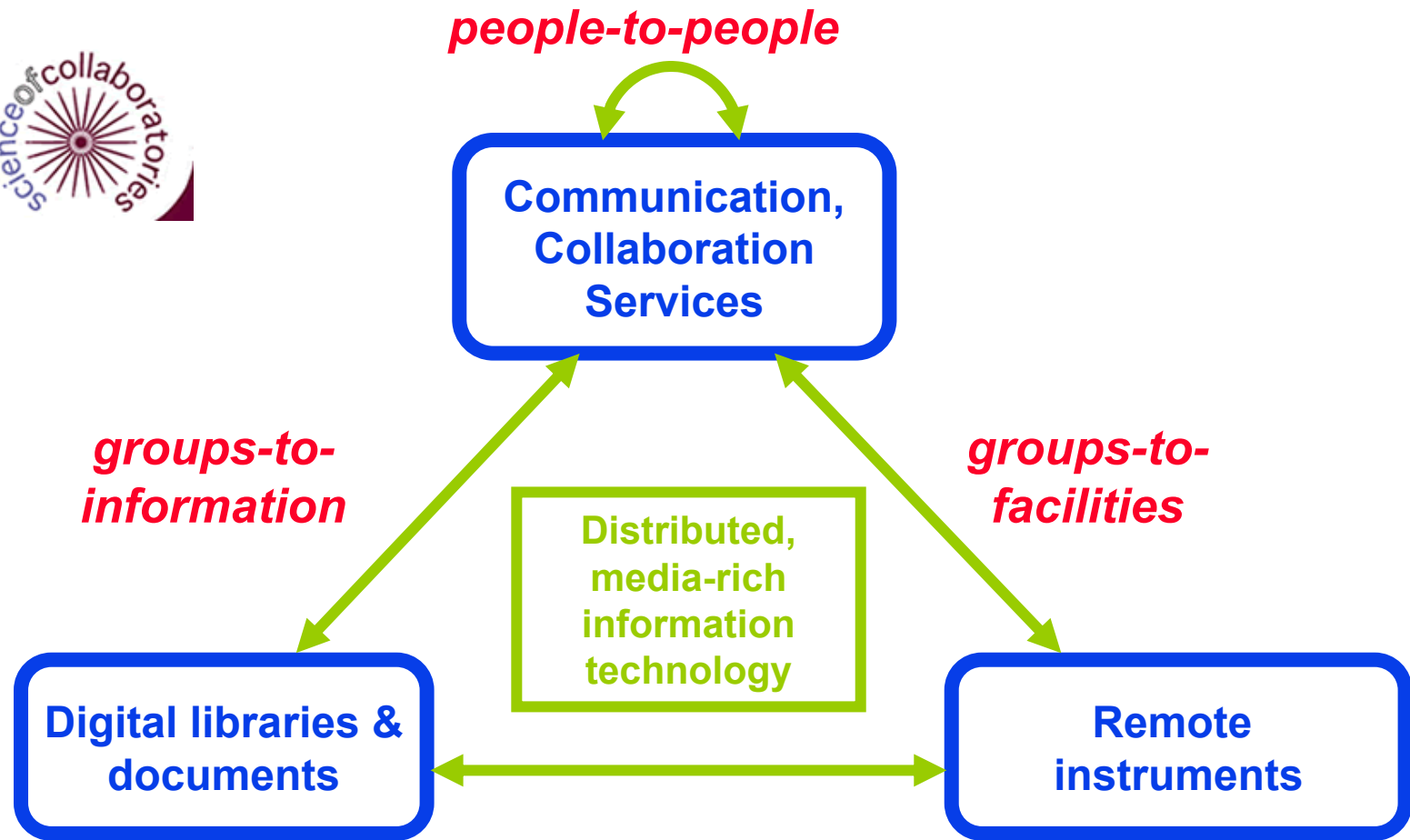
Content new subfolder add file move

	Title	Author	Last Modified
<input type="checkbox"/>	<a href="#">Access GRID-Connection Project</a>	Joseph Hardin	11/05/2000 05:43:23 PM
<input type="checkbox"/>	<a href="#">Collaboratories Papers</a>	Joseph Hardin	11/05/2000 05:43:37 PM
<input type="checkbox"/>	<a href="#">Development Environments</a>	Joseph Hardin	11/05/2000 05:43:49 PM
<input type="checkbox"/>	<a href="#">Existing Learning and Collab Tools</a>	Joseph Hardin	12/08/2000 01:25:24 PM
<input type="checkbox"/>	<a href="#">Feature Lists-Scenarios-Vignettes</a>	Joseph Hardin	12/06/2000 09:58:46 PM
<input type="checkbox"/>	<a href="#">Global Grid Forum</a>	Peter Knoop	02/26/2001 08:55:02 AM
<input type="checkbox"/>	<a href="#">GRID</a>	Joseph Hardin	01/04/2001 01:03:45 PM
<input type="checkbox"/>	<a href="#">Major Collab Initiatives</a>	Joseph Hardin	11/05/2000 05:44:09 PM
<input type="checkbox"/>	<a href="#">NEES</a>	Joseph Hardin	02/13/2001 04:07:41 PM
<input type="checkbox"/>	<a href="#">Non-UM Projects - Related to CHEF?</a>	Joseph Hardin	11/05/2000 05:44:28 PM
<input type="checkbox"/>	<a href="#">OnLine Collab sites</a>	Joseph Hardin	11/05/2000 05:44:37 PM
<input type="checkbox"/>	<a href="#">Presentations</a>	Joseph Hardin	12/07/2000 01:49:38 PM
<input type="checkbox"/>	<a href="#">Search Technologies and Strategies</a>	Joseph Hardin	12/10/2000 04:48:32 PM
<input type="checkbox"/>	<a href="#">Security</a>	Joseph Hardin	01/18/2001 01:15:52 PM

Over 9000 users (2000 active) at the end of 2003



# Science of Collaboratories



<http://www.scienceofcollaboratories.org/>

NSF Funded ITR





# CHEF 1.0

- Fall 2001: CHEF Development begins
  - Generalized extensible framework for building collaboratories
  - “Best-of” CourseTools, SPARC, WorkTools
- Integrate across current UM projects and adopt relevant standards
- Funded internally at UM as replacement for CourseTools
- All JAVA - Open Source
  - Jakarta Jetspeed Portal
  - Jakarta Tomcat Servlet Container
  - Jakarta Turbine Service Container
- Build community of developers through workshops and outreach





# Not “just” a portal

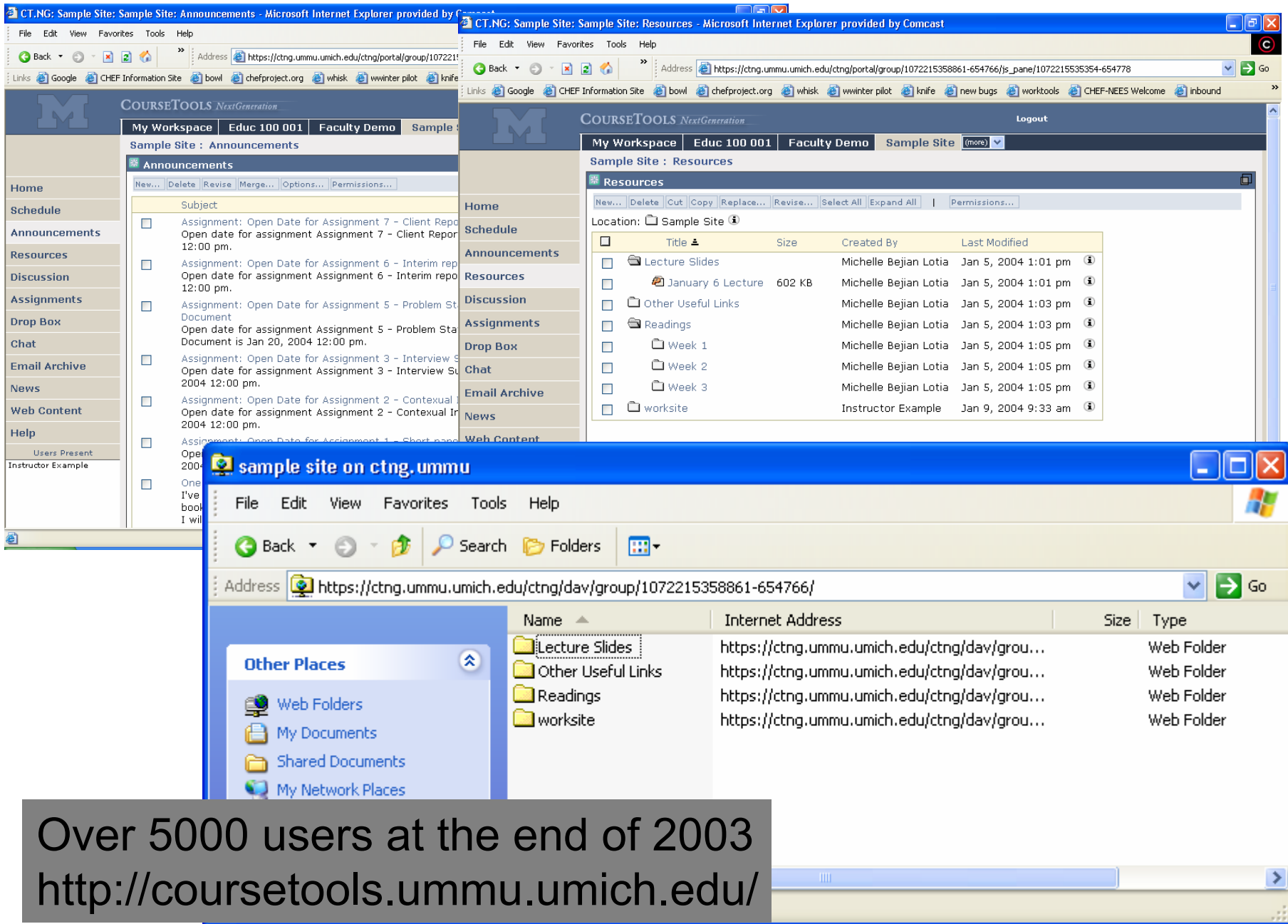
- Portals are a framework to deploy tools (aka rectangles) and focus on how the user wants to arrange their own “rectangles”
- While CHEF technically is a portal, the goal is for the tools to work together closely and seem to really be parts of a larger “tool”
- CHEF has a lot of features, (services, presence, notification, etc..) which bridge the gap between portal and application framework



# CHEF Applications

- CourseTools Next Generation
- WorkTools Next Generation
- NEESGrid
- NSF National Middleware Grid Portal





Over 5000 users at the end of 2003  
<http://coursetools.ummu.umich.edu/>

CT.NG: My Workspace: My Workspace: Worksite Setup - Microsoft Internet Explorer provided by Comcast

Address: https://ctng.ummu.umich.edu/ctng/portal/user/instructor1/js\_pane/500

Links: Google, CHEF Information Site, bowl, chefproject.org, whisk, wwinter pilot, knife, new bugs, worktools, CHEF-NEES Welcome, inbound

**M COURSETOOLS NextGeneration** Logout

My Workspace Educ 100 001 Faculty Demo (more)

**My Workspace : Worksite Setup**

**Worksite Setup**

Revising Sample Site...

Choose a topic to see or change information about this site. If you are returning to this page after making changes, you must choose 'finish'.

Site settings

Edit site description and  
Add or remove tools  
Edit background appear

Site access

Publish, unpublish site  
View participants  
Edit participants  
Make site joinable

Finish

**Worksite Setup**

Add Participant... Remove Participant(s)... Change Role(s)... Back to revising...

Add a participant or edit by checking box and choosing action above.

Class members in Sample Site.

Name	Class member	Role:
<input type="checkbox"/> Bejian Lotia, Michelle	<input type="checkbox"/>	<input type="checkbox"/> Affiliate
<input type="checkbox"/> Example, Instructor	<input type="checkbox"/>	<input type="checkbox"/> Assistant
<input type="checkbox"/> Lotia, Michelle Bejian	<input type="checkbox"/>	<input type="checkbox"/> Candidate
<input type="checkbox"/> Ogle, Daphne L	<input type="checkbox"/>	<input type="checkbox"/> Instructor
<input type="checkbox"/> One, Student	<input type="checkbox"/>	<input type="checkbox"/> Member
<input type="checkbox"/> Three, Student	<input type="checkbox"/>	<input type="checkbox"/> Observer

• User's username:

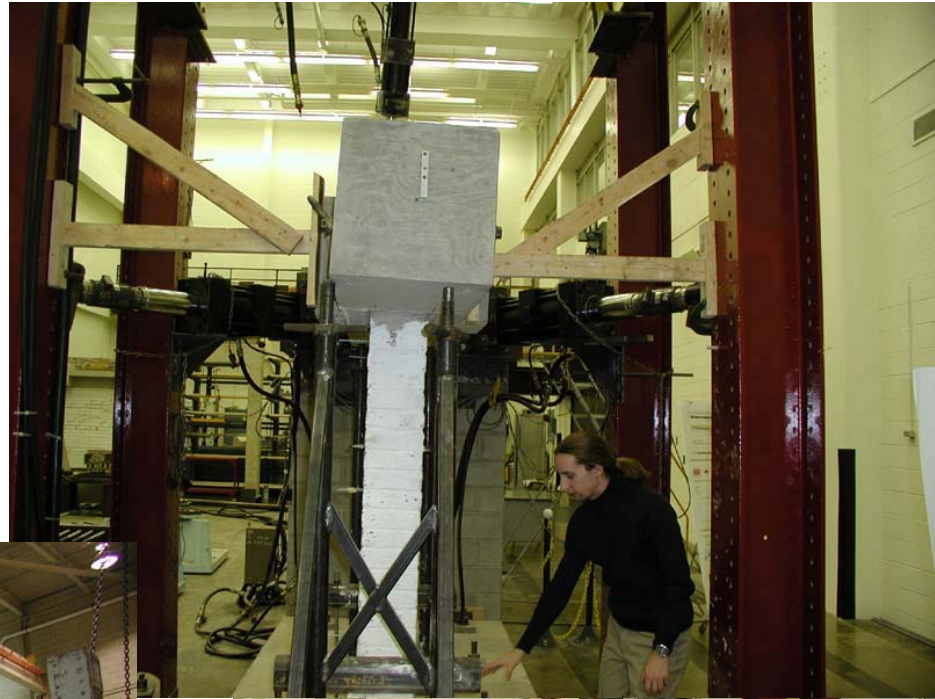
• Role:

- Affiliate
- Assistant
- Candidate
- Instructor
- Member
- Observer

New WorkTools Sites being created in WTNG as of 12/2003  
Run on the same servers as CTNG.

# NEESgrid

## Network for Earthquake Engineering Simulation



NSF Funded.  
NCSA, ANL, USC/ISI, UM, USC, Berkeley, MSU





Event: "Oregon Large Tank Test September 8, 2003"

CHEF (dev-local): Worksite - Microsoft Internet Explorer

Address: http://neespop.ce.unr.edu:9271/chef/portal/group/NEESgridUNR/page/default.psm1/js\_pane/P-f16ab04bfe-10006

Nov 14, 2002 05:43 pm

NEESgrid WorkTools

My Workspace NEESgrid UNR NEESgrid Support NEESgrid All

Video Cameras

Home

Schedule

Announcements

Resources

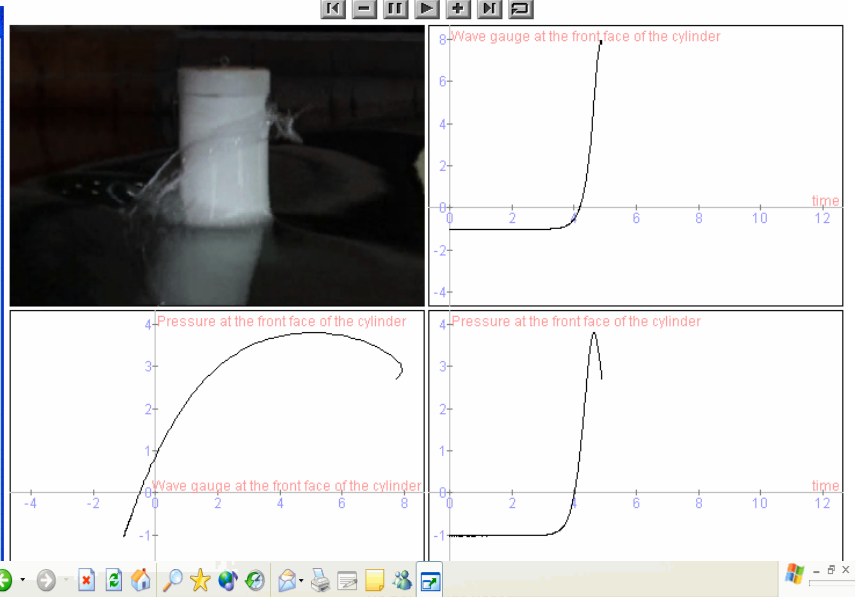

Discussion

Telepresence Server

Video Cameras

TeleRobotic Video Camera 1

UNRCamera1: Thu Nov 14 17:43:19 2002



NEESgrid Building the National Virtual Collaboratory for Earthquake Engineering

My Workspace MOST MOST-Team MOST-Tech

Home

Schedule

Announcements

Resources

Discussion

Chat

UCOL Video

UIUC Video

Repository

Data Viewer

NTCP Data

UCOL Notebook

UIUC Notebook

Non-Contact Data

Streaming Data

Logout

Users Present

Amr Elashai

Hatem Selim

MOST-Team : Repository

NEES Data Browser

# NEES Repository

Symbol key:

- The folder is open (click to close).
- The folder is closed (click to open).

Follow a link between objects.

New Object Copy Object Edit Object Delete Object

Root Container

- MOST data
- CU MOST experiment description
- MOST experiment underway
- MOST experiment 1500 steps
- UIUC MOST data 1500 steps
- CU MOST 1500 steps (partial)
- NCSA most data 1500 steps
- cu-most-dry.mostExpData
- uiuc-most-dry2:JUL30.txt
- NCSA MOST log
- UIUC MOST experiment description
- test material
- test unit
- test unit term
- test unit quant

File "UIUC MOST data 1500 steps"

io:logicalName uiuc-most-dry2:JUL30

File information:

Size: 164.88kB  
Created: 7/30/03 11:54 AM  
Last accessed: 7/30/03 6:12 PM

Download

Version: 2 1  
Time created: 7/30/03 11:54 AM  
Time updated: 7/30/03 1:34 PM

NEESgrid WorkTools

My Workspace NEESgrid UNR NEESgrid Support NEESgrid All

Nov 14, 2002 05:40 pm

Data Viewer

Event: "core: ex2 sine1-4"

Home

Schedule

Announcements

Resources

Discussion

Telepresence Server

Video Cameras

Enotebook

Data Browser/Viewer

NEESgrid Repository

Chat

Browse Testbed

Testbed Status

News

Logout

Customize

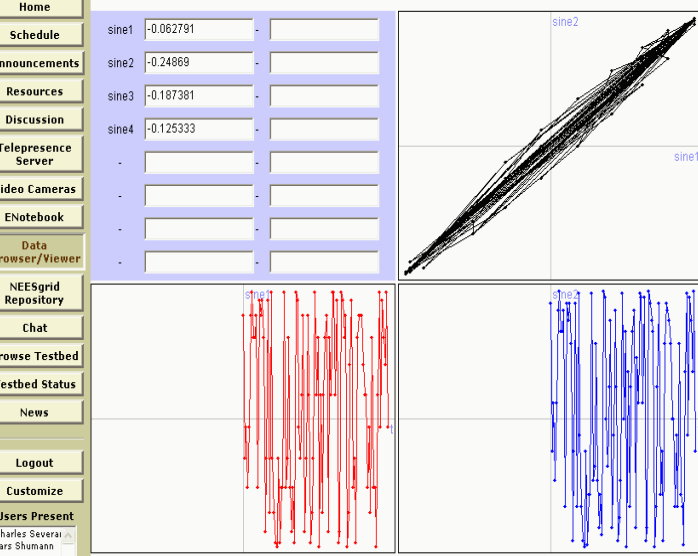
Users Present

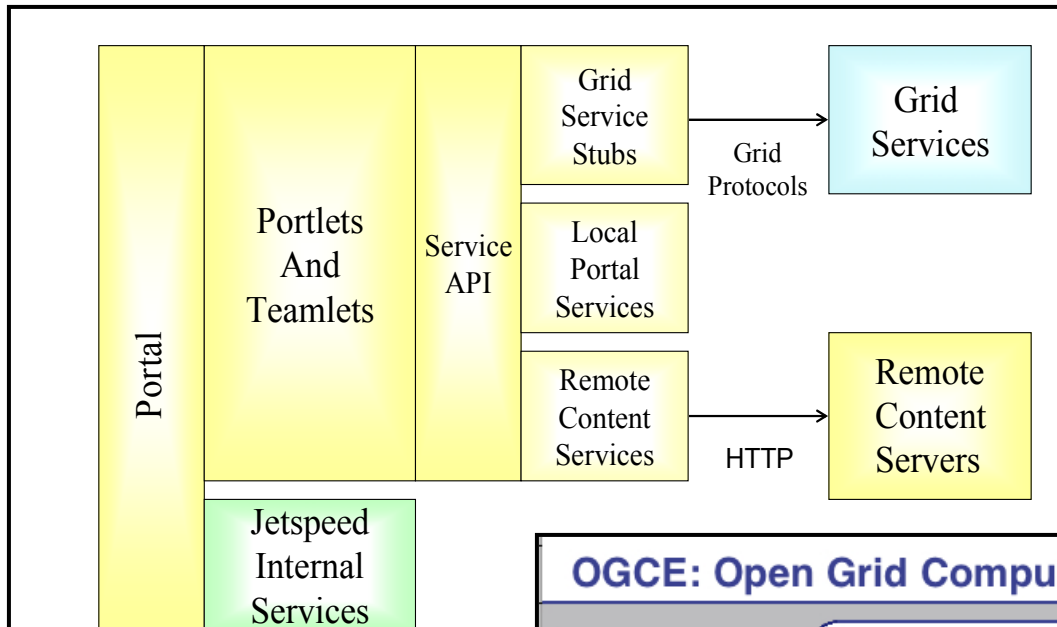
Charles Severance

Lars Shumann

Back

sine1	-0.062791
sine2	-0.24869
sine3	-0.187381
sine4	-0.125333





[www.ogce.org](http://www.ogce.org)

Figure 4: The revised portal architecture portal services.

## OGCE: Open Grid Computing Environment

- Home
- News
- FAQ
- Download
- Install
- Documents
- Related Work
- Screenshots
- Sponsors
- Contacts

### OGCE - Open Grid Computing Environments Collaboratory

As the use of Grid technologies expands and more organizations set up Grids, the need for user-friendly access to Grids becomes critical. Portals provide access to Grid technologies through sharable and reusable components for web-based access to scientific and business-oriented applications. Sharable components allow the portal developer to quickly create Grid Portals from provided libraries that support baseline Grid technologies (such as file transfer, job launching and monitoring, and access to information services), freeing the developers to concentrate on the specialized needs of a particular scientific community or collaboratory.

With funding from the National Science Foundation Middleware Initiative the OGCE project was established in Fall 2003 to foster collaborations and sharable components with portal developers worldwide. Tasks include the establishment of a Grid Portal Collaboratory, a repository of portlet and portal service components, an online forum for developers of Grid Portals, and the building of reusable portal components that can be integrated in a common portal container system.

OGCE leverages ongoing portals research and development from Argonne National Laboratory, Indiana University, the University of Michigan, the National Center for Supercomputing Applications, and the Texas Advanced Computing Center. Collectively, these institutions form the charter members of the Open Grid Computing Environments (OGCE) consortium.

OGCE encourages community participation on several levels. If you wish to contribute or to participate, please contact us at [webmaster@ogce.org](mailto:webmaster@ogce.org).

NSF National Middleware Initiative  
 Indiana, UTexas, ANL, UM, NCSA





# What we learned in 10 years.

- Portal technology is a good idea - forces component approach - functionality does not “smear”
- Portals are not just aggregators of independent information - but can be an application framework
- Many (but not all) tools can be used for both teaching and learning and research collaboration
- Separating functionality into lightweight GUI components and pluggable services with strong and well-specified APIs allows significant reusability
- GUI elements program to abstract service interfaces - not databases, file systems, LDAP, etc. - this allows great flexibility.

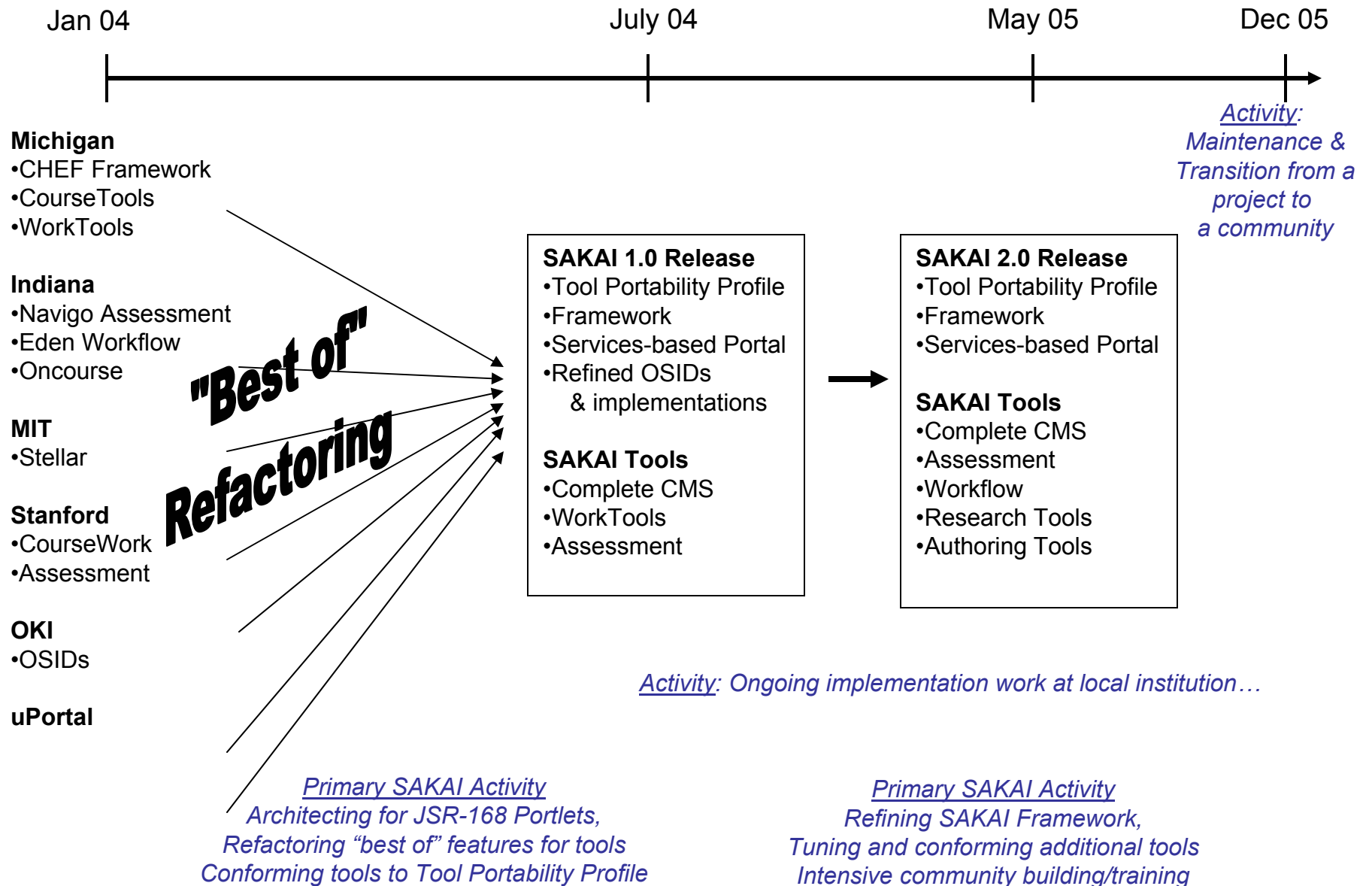


# While we were building collaboratories...

- The Open Knowledge Initiative (OKI) at MIT was developing APIs for learning management systems - involving many universities (UM, Indiana, Stanford, and MIT were strong participants)
- Indiana, Stanford, MIT all developed learning management system
- Java Community Process (JCP) produced JSR-168 - The “unified” portal standard API
- Oasis developed the Web Services for Remote Portals (WSRP) standard
- The open-source uPortal portal project had quietly moved into the #1 open source portal (#4 including commercial vendors)



# So we got together and drew an über collaboration picture...



Thursday, January 22, 2004

## 4 Colleges Collaborate on Open-Source Courseware

By [ANDREA L. FOSTER](#)

In what may be a big threat to commercial providers of course-management systems, four universities have announced a \$6.8-million collaborative venture to create open-source courseware tools and related software for higher-education institutions.

The universities developing the system, called the Sakai Project, are the Indiana University system, the Massachusetts Institute of Technology, Stanford University, and the University of Michigan at Ann Arbor, which will lead the effort.

### HEADLINES

[Bush proposes](#) \$250-million job-training program in visits to community colleges

[U. of Pennsylvania](#) to name Amy Gutmann of Princeton as its new president

[Record companies](#) sue 532 computer users, accusing them of illegally sharing songs

[4 colleges](#) collaborate on open-source courseware



# 境

KYOU / sakai

Boundary, Situation

## Sakai Core Members

- Universities
  - Indiana
  - Michigan
  - MIT
  - Stanford
- Projects
  - Open Knowledge Initiative (OKI)
  - uPortal - JaSIG
- Funding (\$6.8M - 2 Years)
  - Mellon Foundation
  - Hewlett Foundation
  - Partners Program
  - Core member match



# What we agreed to build...

- A Collaborative Learning Environment
  - Open Source
  - Uses OKI (Open Knowledge APIs)
  - Uses uPortal as its portal framework
- Similar to
  - Blackboard
  - WebCT
- And all four core institutions would deploy the commonly developed software



# Sakai 1.0

- Site based collaboration environment
  - Worksite management
  - E-Mail Lists
  - Threaded Discussion
  - Resources (folders) with WebDav support
  - Chat
  - No search yet :(
  - Many other tools
- Beta Release July 15, 2004
- Production site available at [ctools.umich.edu](http://ctools.umich.edu)





# More Sakai Beta Tools

**Admin: Alias Editor (chef.aliases)**

**Admin: Archive Tool (chef.archive)**

**Admin: Memory / Cache Tool  
(chef.memory)**

**Admin: On-Line (chef.presence)**

**Admin: Realms Editor (chef.realms)**

**Admin: Sites Editor (chef.sites)**

**Admin: User Editor (chef.users)**

**Announcements (chef.announcements)**

**Assignments (chef.assignment)**

**C. R. U. D. (sakai.crud)**

**Chat Room (chef.chat)**

**Discussion (chef.discussion)**

**Discussion (chef.threadeddiscussion)**

**Dissertation Checklist (chef.dissertation)**

**Dissertation Upload**

**(chef.dissertation.upload)**

**Drop Box (chef.dropbox)**

**Email Archive (chef.mailbox)**

**Help (chef.contactSupport)**

**Membership (chef.membership)**

**Message Of The Day (chef.motd)**

**My Profile Editor (chef.singleuser)**

**News (chef.news)**

**Preferences (chef.noti.prefs)**

**Recent Announcements**

**(chef.synoptic.announcement)**

**Recent Chat Messages (chef.synoptic.chat)**

**Recent Discussion Items**

**(chef.synoptic.discussion)**

**Resources (chef.resources)**

**Sample (sakai.module)**

**Schedule (chef.schedule)**

**Site Browser (chef.sitebrowser)**

**Site Info (chef.siteinfo)**

**Web Content (chef.iframe)**

**Worksite Setup (chef.sitesetup)**

**WebDAV**



# Sakai Going Forward

- Focus on the "Learning" of Collaborative Learning Environment through 2Q05
  - Getting ready for production deployment at the four partner sites
  - Improving the look and feel of the software
  - Many feature enhancements (to satisfy four + 60 schools)
  - New GUI Programming Environment based on Java Server Faces
  - Building new set of Sakai APIs (Java)
    - Based on OKI - Enabling RDF
- Move into OGCE and NEESGrid starting 3Q04
- Release 2.0 - 2Q04



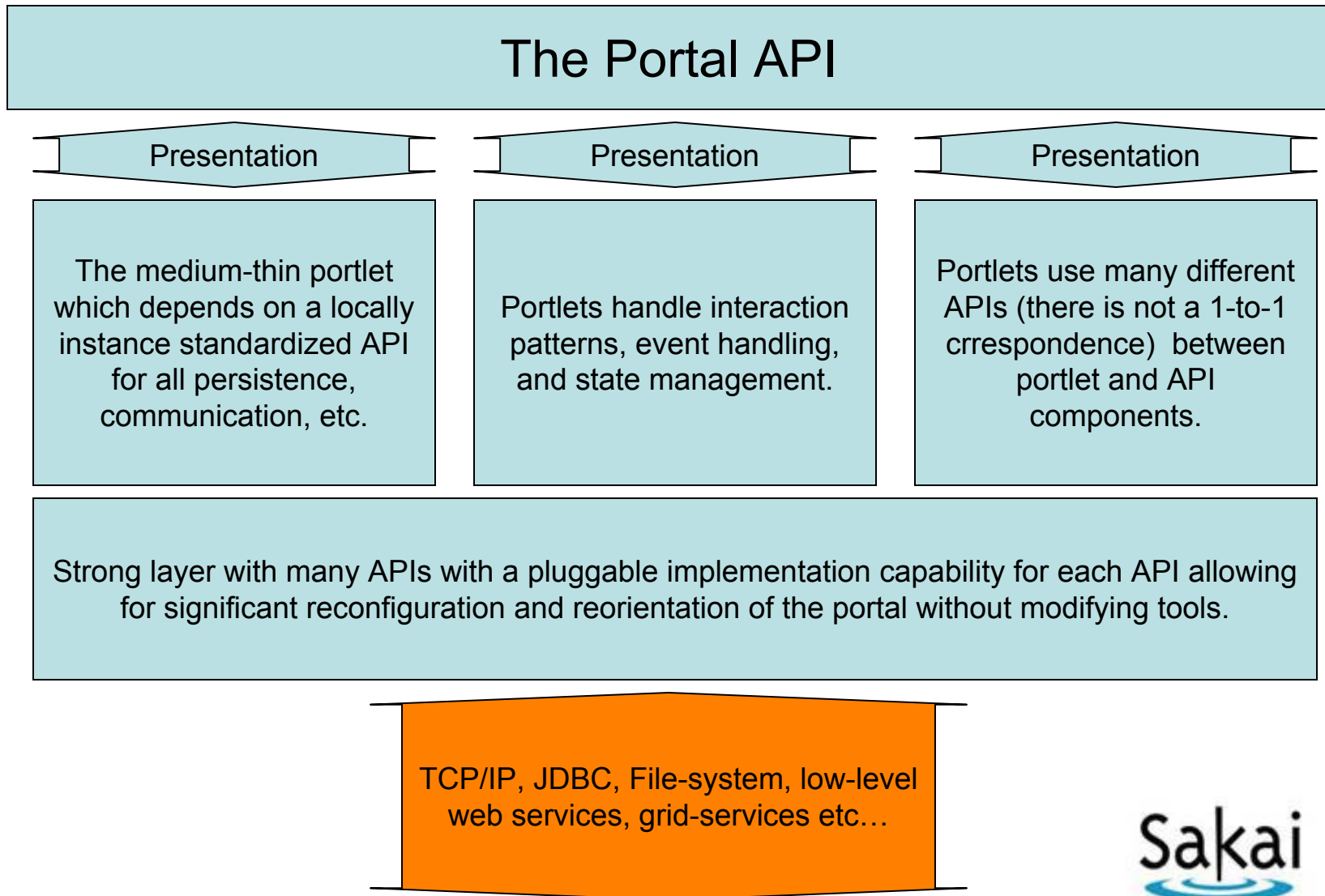
# Sakai Architecture

QuickTime™ and a  
TIFF (Uncompressed) decompressor  
are needed to see this picture.

QuickTime™ and a  
TIFF (Uncompressed) decompressor  
are needed to see this picture.

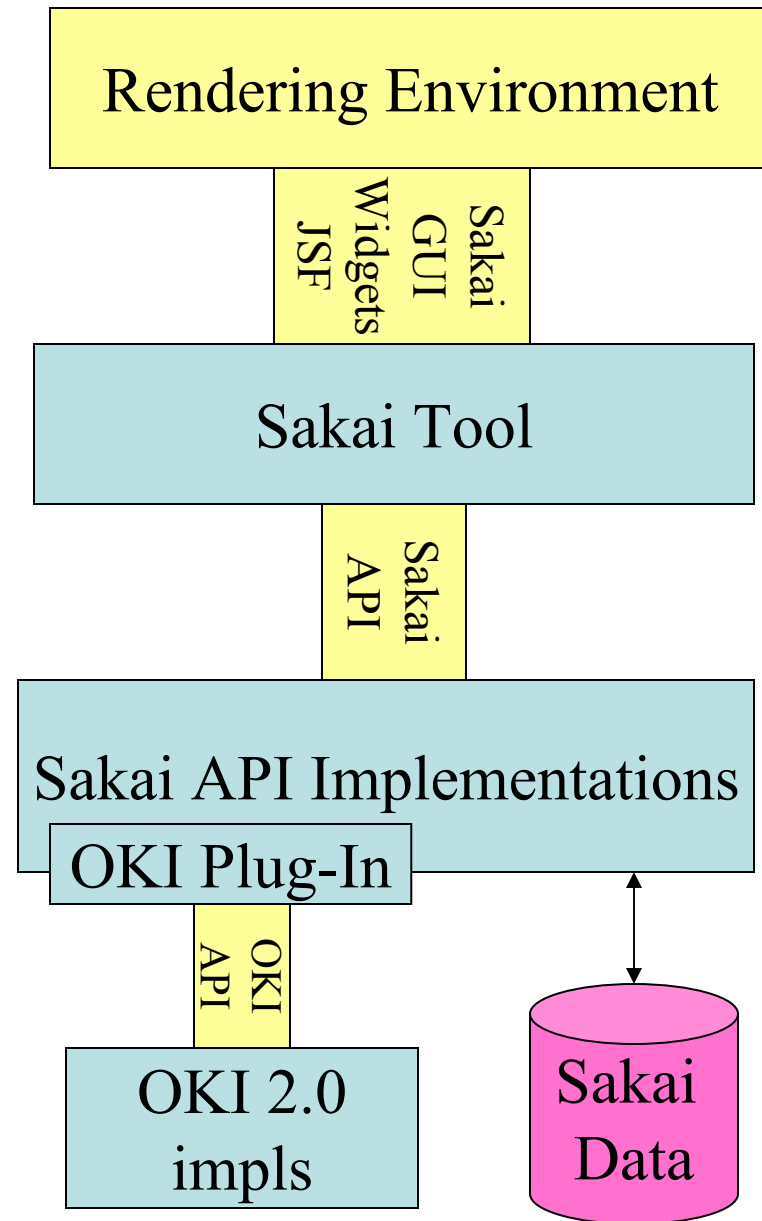


# Portlet Design Patterns - Where does the information come from / go to?



# The Sakai Tool Portability Profile Framework

The Sakai API is based heavily on the OKI API but focused on the portability and interoperability of Sakai tools. The Sakai API should be thought of as value add on top of the OKI APIs. The Sakai APIs encode what OKI would call “out-of-band” agreements explicitly into method calls, parameters and return values.



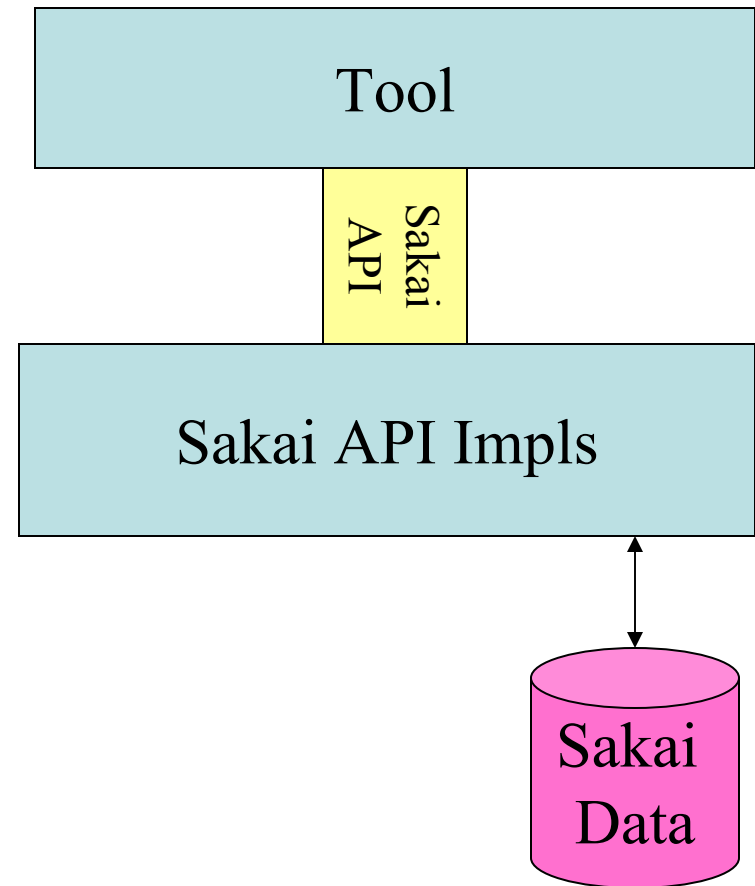
# Sakai Application Programming Interfaces (APIs)

- Make tool development easier
- Promote data and tool portability between Sakai environments
- Hide some data management details
- Error handling
- Provide re-usable system and application services to tool developers



# Simple Deployment

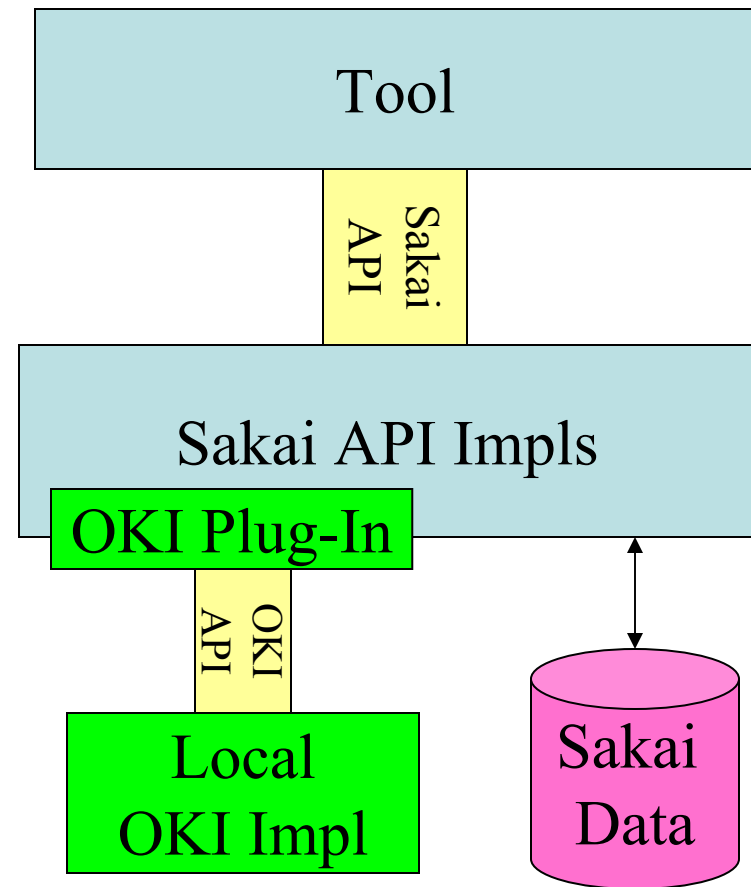
In a simple deployment, the Sakai system may just use the Sakai provided API implementations and point it at a database connection, let Sakai build the tables - and off we go.





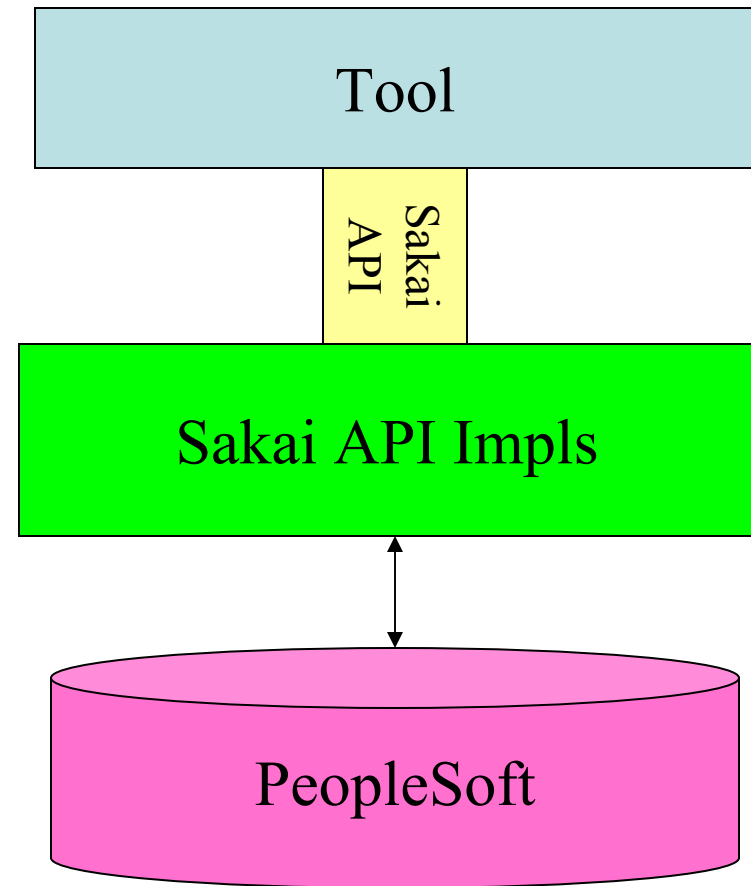
# Basic Local Customization

In the most common situation, local sites will want to customize a few things - perhaps AUTHN, AUTHZ, a few DR's. Sites will write/procure/configure OKI implementations which plug into the Sakai implementations. The Sakai implementations are configured to "federate" between data from the plug-in and the Sakai data as desired by the site.



# Drastic Local Customization

At some level, it would be possible to completely re-implement the entire Sakai API for the particular component (i.e. grading). Because the Sakai APIs have no “out-of-band” agreements, the tools cannot perceive that the implementation has been changes.



# Concepts and Terminology

QuickTime™ and a  
TIFF (Uncompressed) decompressor  
are needed to see this picture.

QuickTime™ and a  
TIFF (Uncompressed) decompressor  
are needed to see this picture.



# Sakai Technology

- Hibernate for object persistence
- Sakai APIs that imitate OKI OSIDs
- Tools are based on APIs and servlets
- JavaServer Faces separate out the presentation from tool logic
- uPortal integrates tools at the UI level



# Specific TPP Elements

- GUI: Java Server Faces + Sakai Widgets
- Framework API
  - Best practice: Setter-style dependency injection
    - Both tools and services are components\*
    - Cross-webapp service framework
  - Service locator also supported
- No (zip, zero, nada) framework imports required



# JSF Mini Tutorial

- Document-based layout which relates a view stored in a set of beans using a set of widgets (button, input, drop-down) and a set of action methods associated with buttons, etc.
- There are no URLs (munged or otherwise)
- Additional Sakai widgets within JSF in insure look and feel at a higher level across tools

```
<sakai:tool_bar>
  <sakai:tool_bar_item
    action="#{AnnouncementTool.processActionListNew}"
    value="#{msgs.annc_list_new}" />
  <sakai:tool_bar_item
    action="#{AnnouncementTool.processActionListDelete}"
    value="#{msgs.annc_list_delete}" />
  ...
```

# JSF is Used to Describe the UI

```
<sakai:view_container title="#{msgs.sample_title}">
```

```
<sakai:tool_bar> <sakai:tool_bar_item/> </sakai:tool_bar>
```

Sample

Continue

Please enter some information

Information

Name:

date JUN 22 2004

Continue

```
<sakai:instruction_message  
value="#{msgs.sample_one_instructions}" />
```

```
<sakai:group_box  
title="#{msgs.sample_one_groupbox}">
```

```
<h:inputText  
value="#{MyTool.userName}" />
```

```
<sakai:date_input  
value="#{MyTool.date}" />
```

```
<sakai:button_bar>  
  <sakai:button_bar_item  
    action="#{MyTool.processActionDoIt}  
    value="#{msgs.sample_one_cmd_go}" />  
</sakai:button_bar>
```





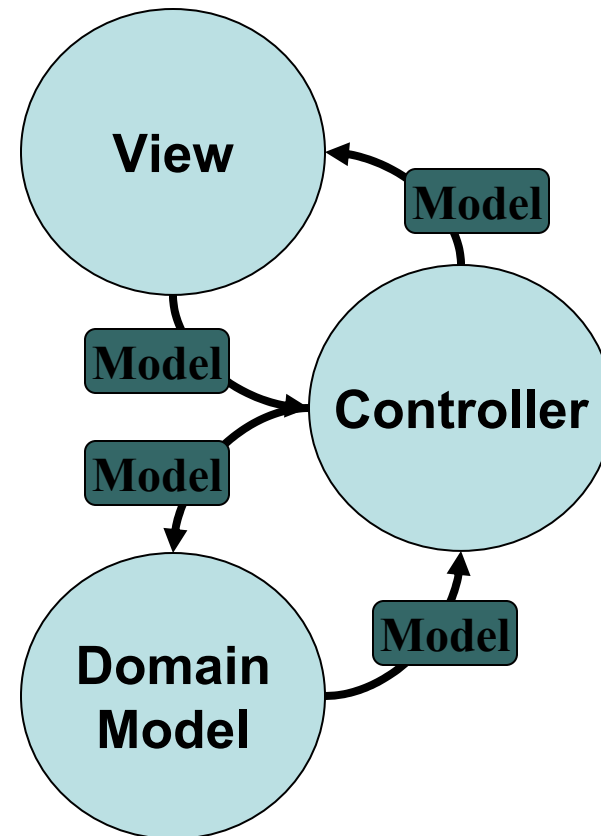
# Model View Controller Mini Tutorial

- Domain Model
  - Long Term Persistence
- Controller
  - Orchestra conductor
  - Retrieves the Model (subset of Domain Model)
  - Holds state in terms of the user interaction
  - Decorates the Model with view specific information
  - Selects Layout
  - Hands layout and Decorated-Model to View
  - Processes the returned Decorated-Model from View
- View
  - Renders Decorated-Model to user using layout
  - Handles user interaction (possibly with validation)
  - Returned Modified-Decorated-Model to Controller



# MVC Mini Tutorial

- Domain Model
  - Persistence
- View
  - Renders decorated model
- Controller
  - Orchestrates
- Model
  - Data moved between elements



# Inversion of Control Mini Tutorial

- Components code to interfaces, not implementations
- When a component needs an implementation for a particular interface, how does it find the implementation
- Four basic approaches (formerly known as Level 0-3 IoC)
  - Service Locator (Turbine, Avalon)
  - Interface Injection (Avalon)
  - Setter Injection (Spring)
  - Constructor Injection (Pico)

<http://www.martinfowler.com/articles/injection.html>



# Service Locator

- Component calls a service locator with the desired interface as a parameter
  - Can gather dependencies dynamically this is useful if dependency lookup is expensive
  - This does force an explicit dependency on the framework

```
class MovieLister...  
    MovieFinder finder =  
        (MovieFinder) ServiceLocator.getService("MovieFinder");
```



# Interface Injection

- The component declares that it “implements serviceable” which triggers the framework to poke in the implementations via well-known methods (Avalon)
  - Often this is used to inject a service locator and then that service locator is used to garner other dependencies

# Setter Injection (Sakai preferred)

- The component simply provides bean-style setter and getter methods for the dependent interfaces it needs - framework constructs object then calls the setter for anything that is already in the framework (auto-wire)
  - No explicit dependency on the framework at all
  - Articulates well with all of the bean support in lots of places
  - Not able to declare which of the setters are required for safe operation unless this is in a XML config file



# Constructor Injection

- The component provides a number of constructors with the dependencies as parameters - the framework picks one and constructs the object with all of its needed dependencies.
  - The object is never in a “partially ready to go” state
  - Can express multiple acceptable dependency sets using different constructors
  - No explicit dependencies on the framework
  - Cannot work unless the framework is doing the constructing (I.e. no chance to “fake it” in Servlet or JSF managed objects)



# IoC Summary

- Setter injection is the best practice for new code
  - No explicit dependencies
  - Leverages bean support
  - Can be “simulated” easily when framework is not constructing objects
- We will always support Service Locator





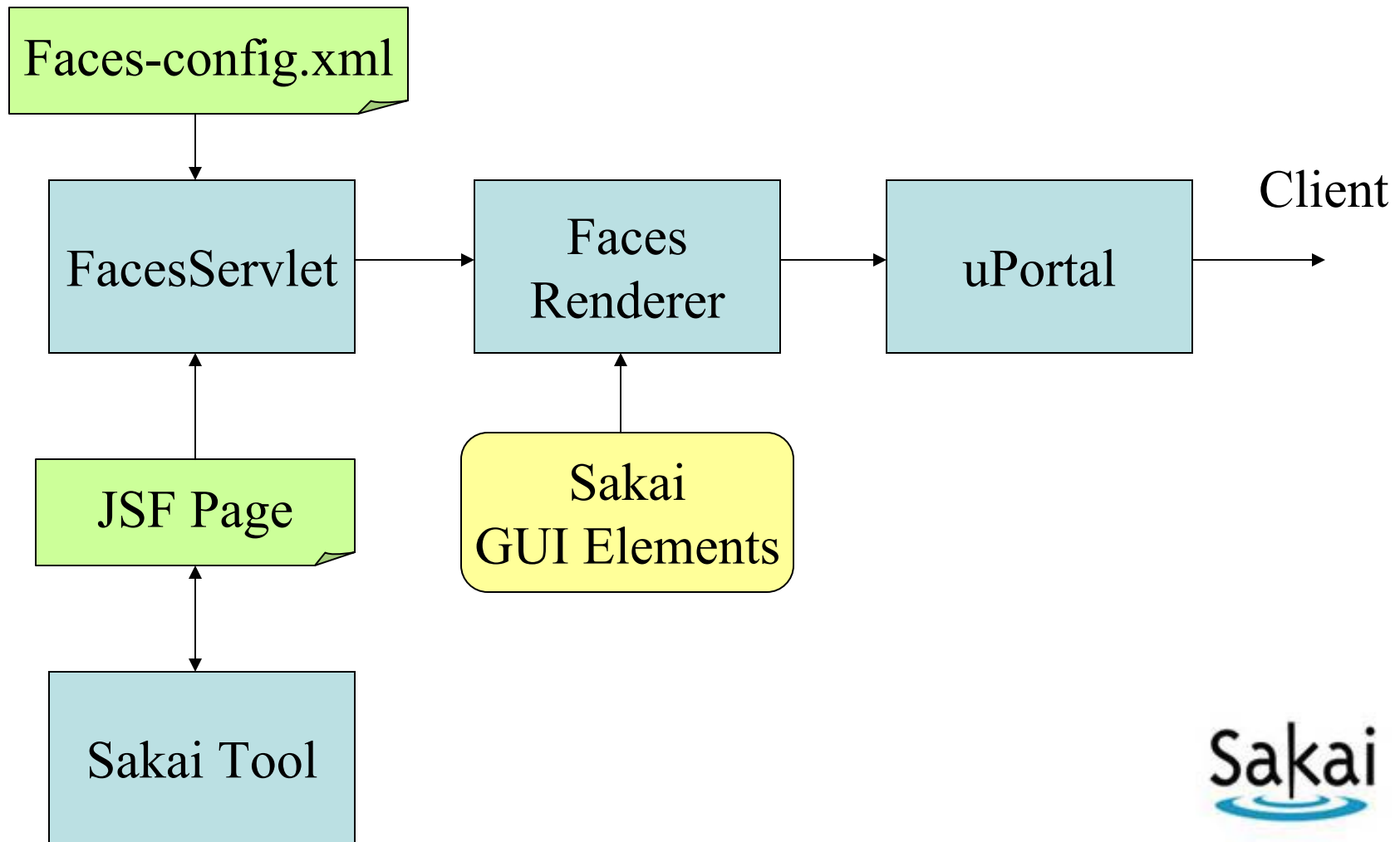
# Sakai Presentation

QuickTime™ and a  
TIFF (Uncompressed) decompressor  
are needed to see this picture.

QuickTime™ and a  
TIFF (Uncompressed) decompressor  
are needed to see this picture.



# The Sakai User Interface Process



All the components...  
On one slide :)

JSF Servlet Render

Portlet Render

JSP Layout

<sakai:toolbar>  
< ...

...

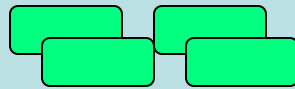
JSP Layout

<sakai:toolbar>  
< ...

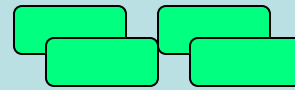
Framework/Config

Tool

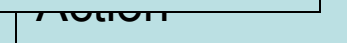
Config Beans



View Beans



Action



Service

Method

Method

Config Beans



Service

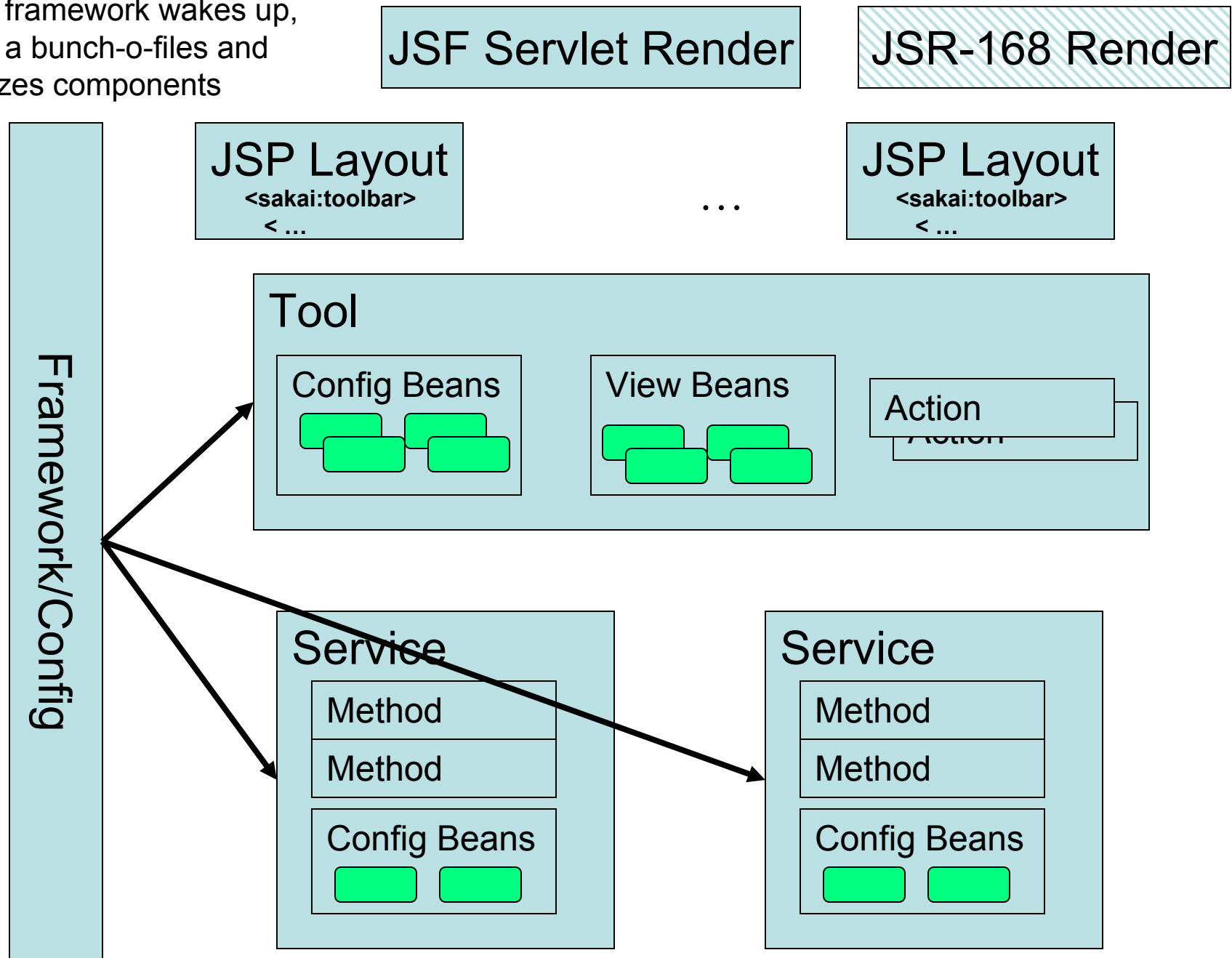
Method

Method

Config Beans

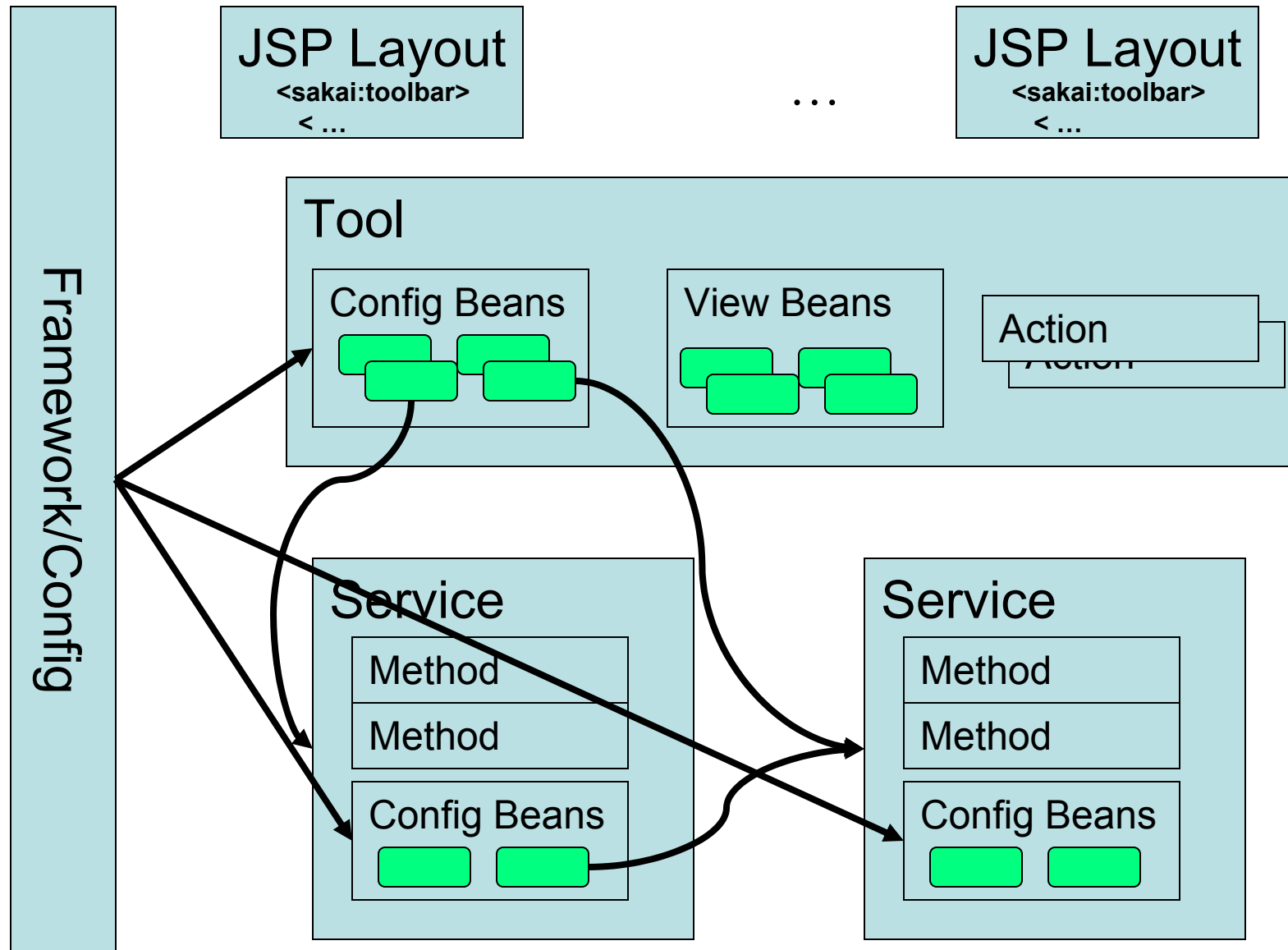


Sakai framework wakes up,  
reads a bunch-o-files and  
initializes components



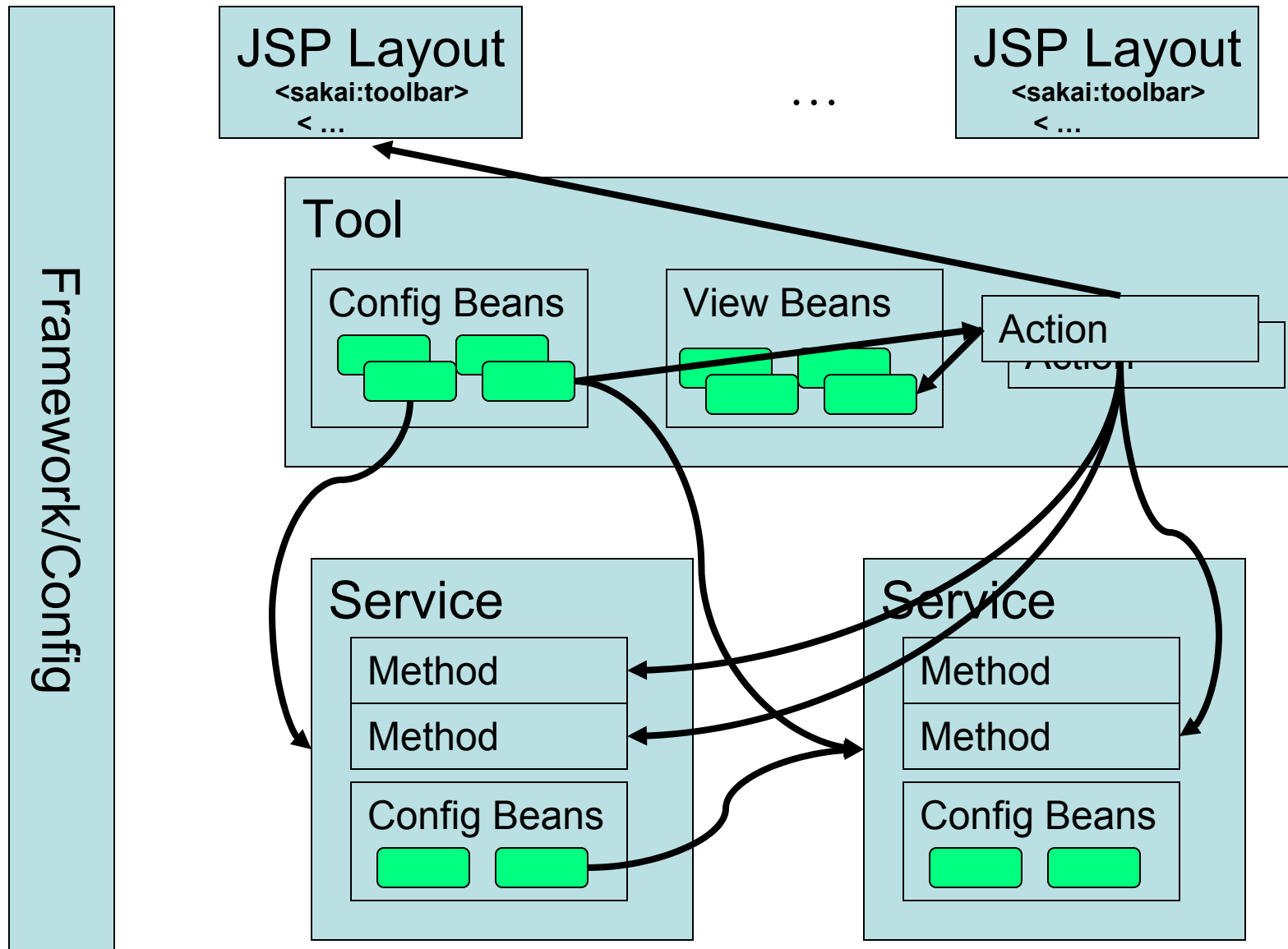
Sakai then pokes config data and auto-wires service implementations into beans

## JSF Servlet Render

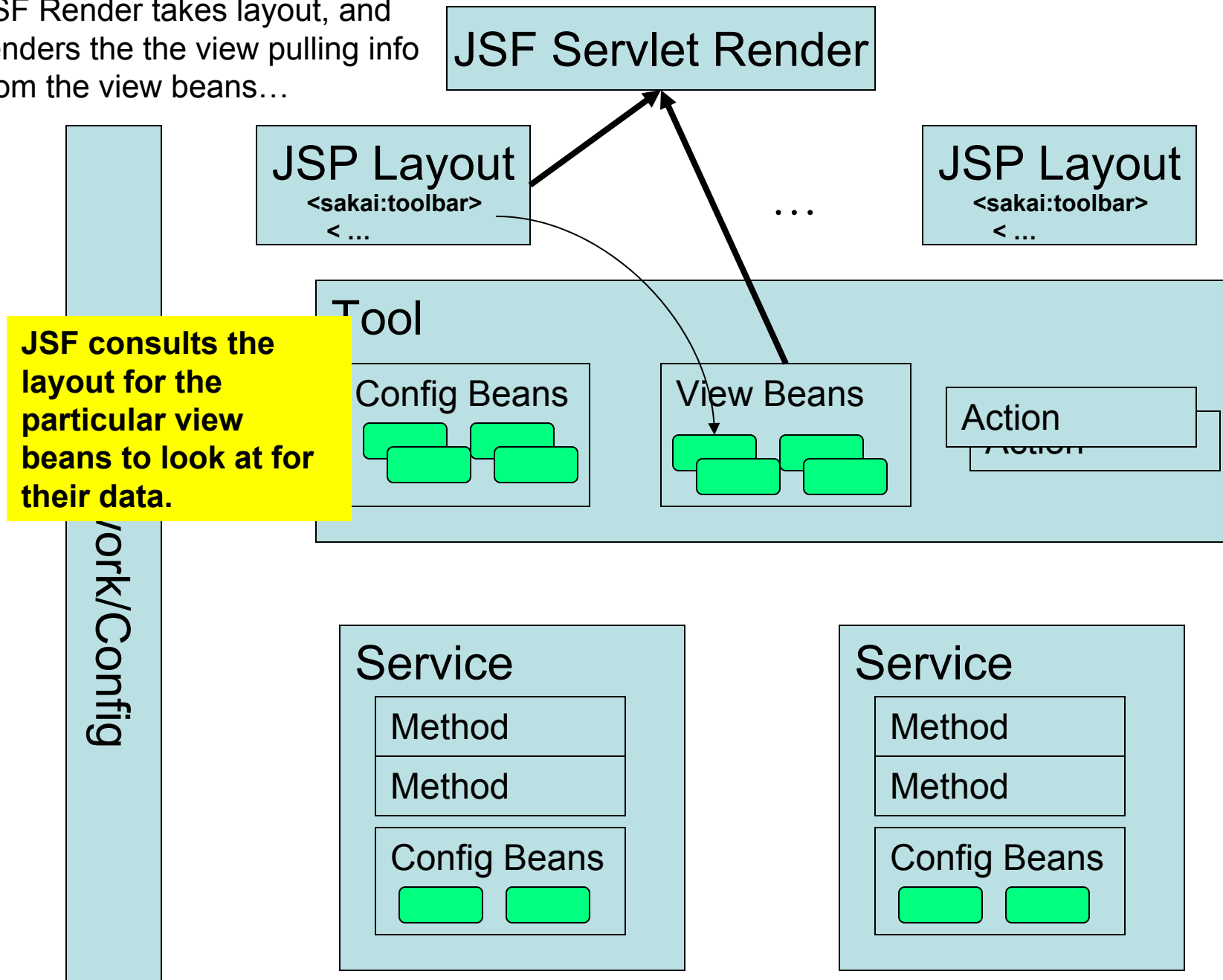


Action runs, accesses services through config beans, sets view beans, selects layout mode.

## JSF Servlet Render



JSF Render takes layout, and renders the the view pulling info from the view beans...

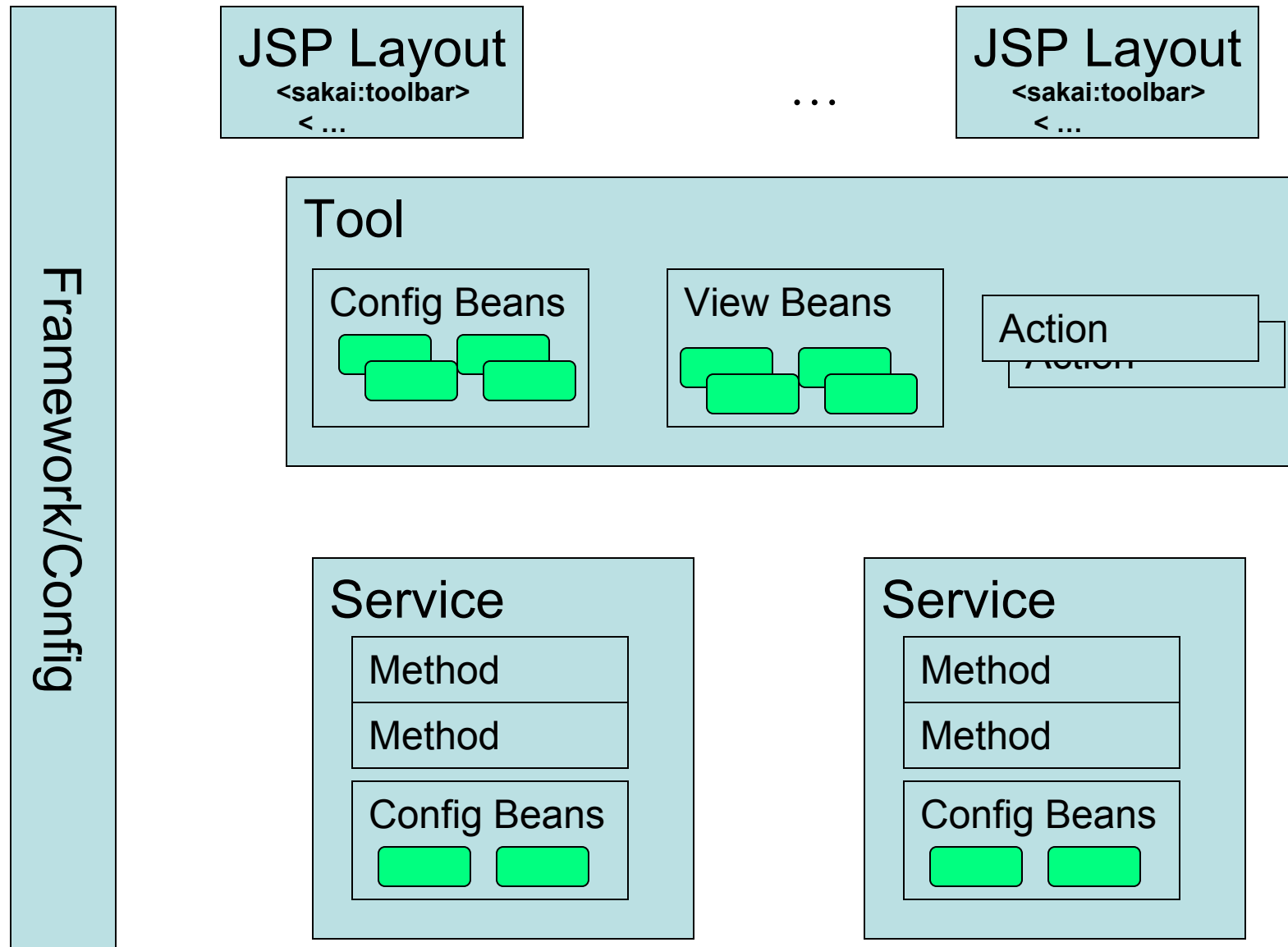


JSF consults the layout for the particular view beans to look at for their data.

work/Config

Then we wait... It is quiet...  
Too quiet.. And then the user  
pushes a button.

## JSF Servlet Render

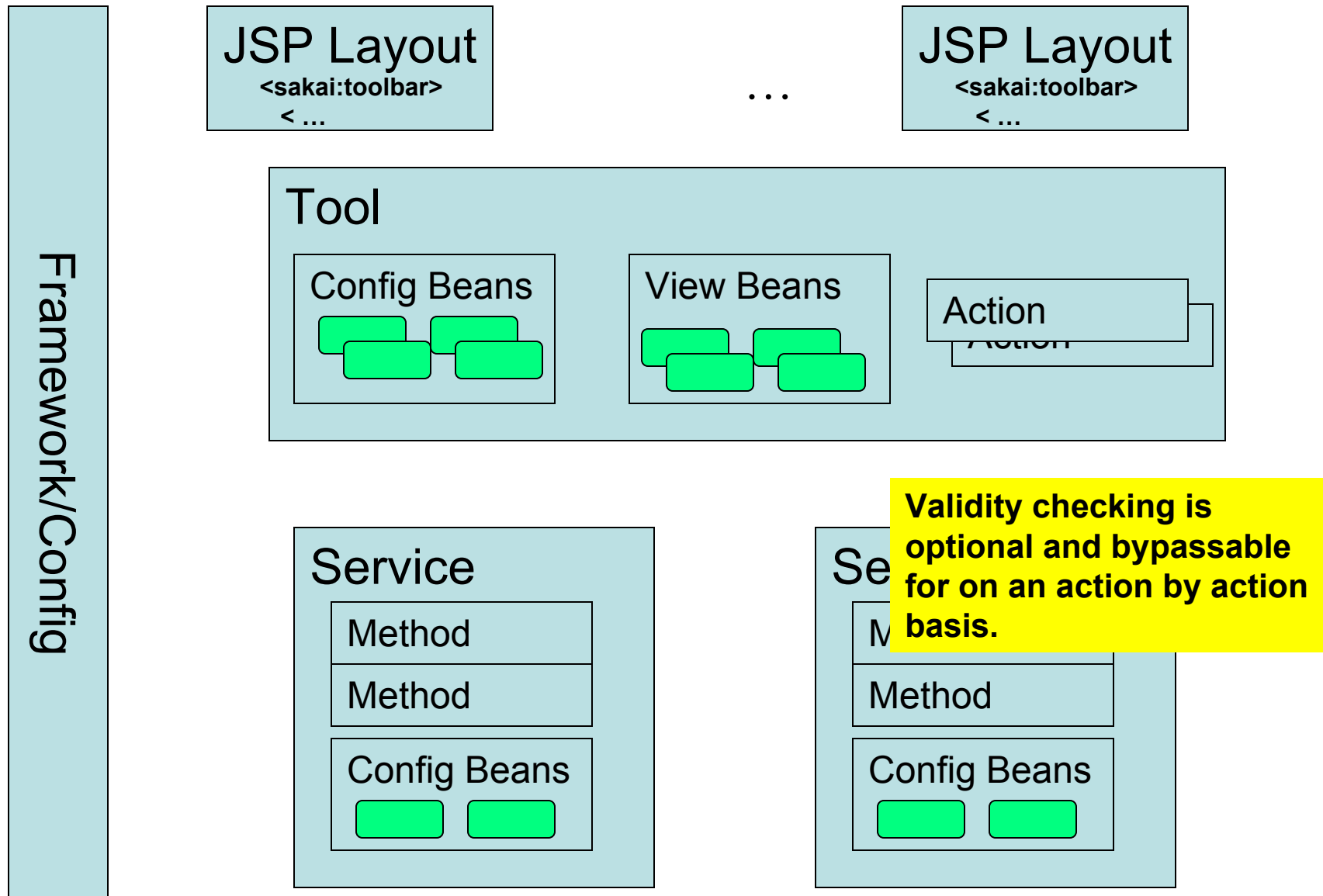




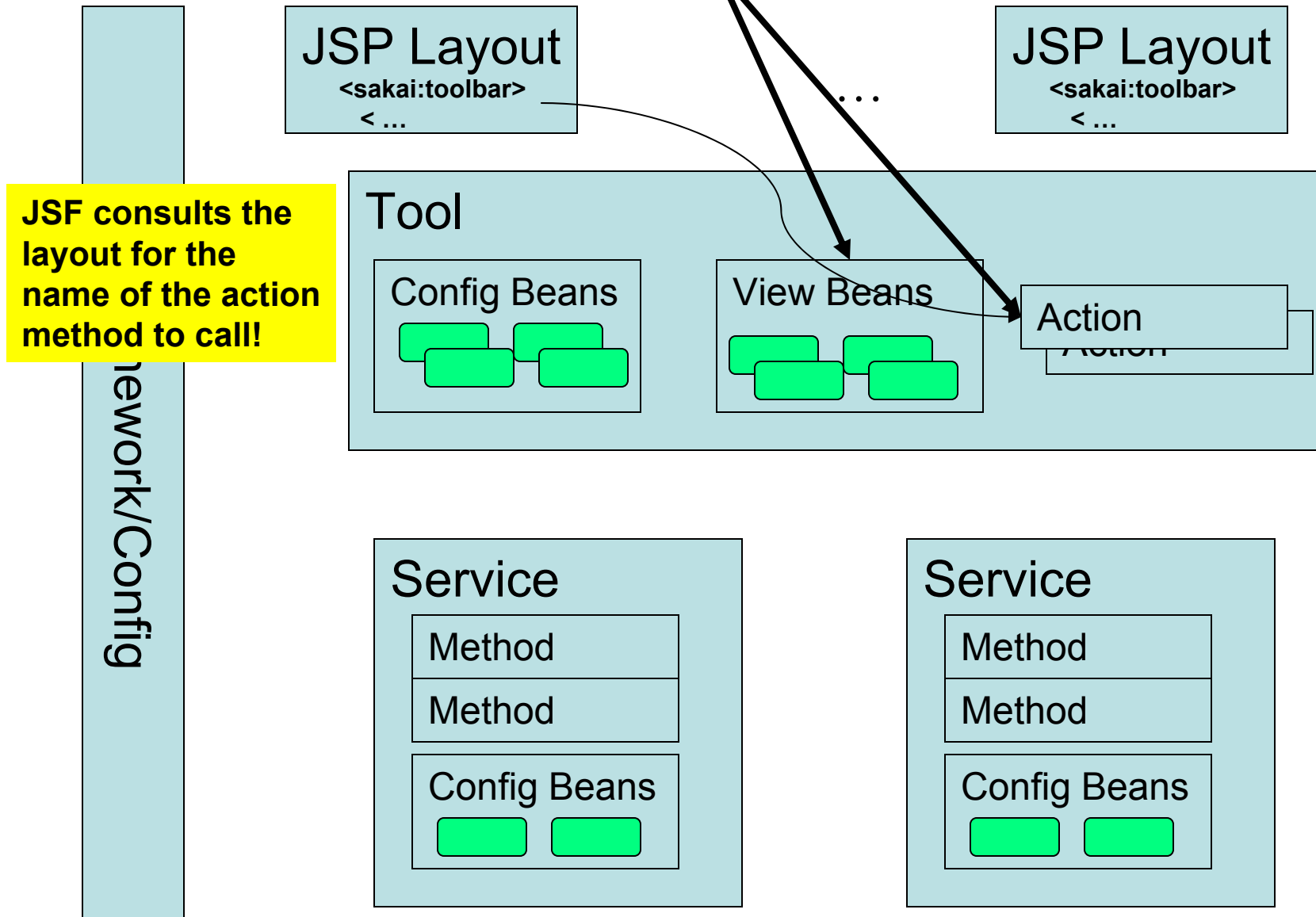
Merde!

Oops.. The user entered invalid data - JSF scolds them and gives them another chance...

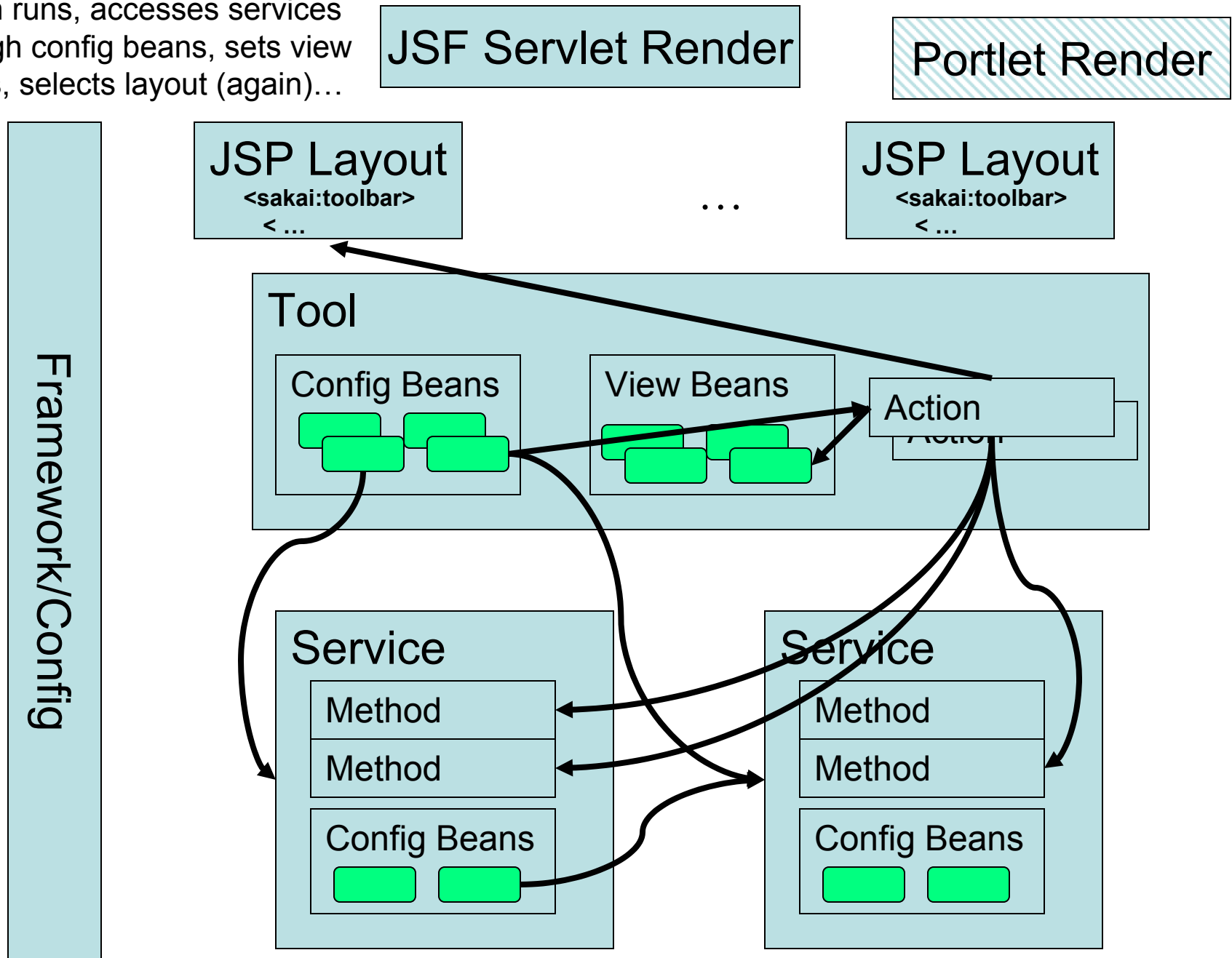
## JSF Servlet Render



Le User enters valid information,  
JSF sets the View Beans and  
calls the requested action...



Action runs, accesses services through config beans, sets view beans, selects layout (again)...



# Sakai and uPortal / JSR-168

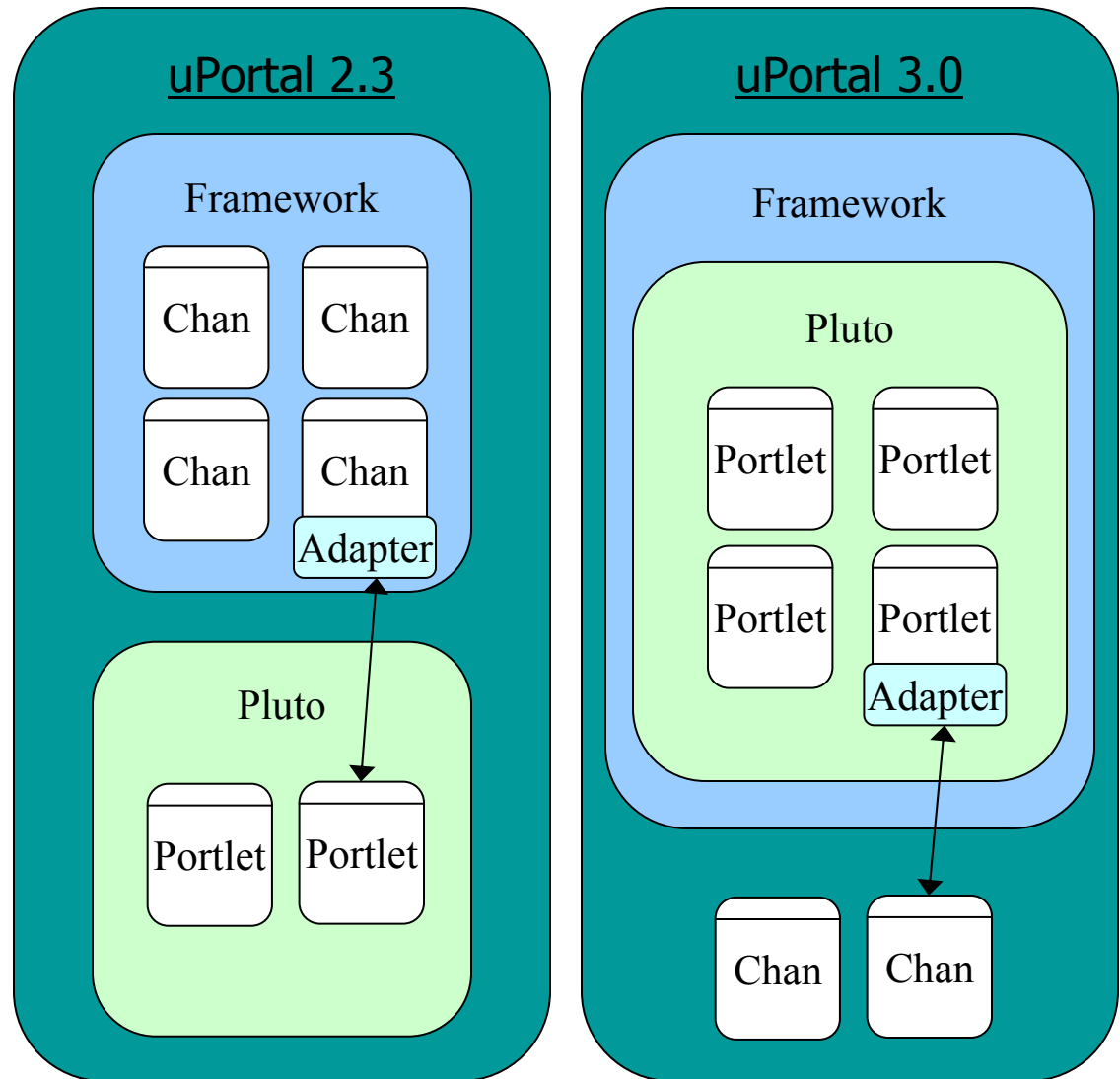
QuickTime™ and a  
TIFF (Uncompressed) decompressor  
are needed to see this picture.

QuickTime™ and a  
TIFF (Uncompressed) decompressor  
are needed to see this picture.



# uPortal Portlet Roadmap

- uPortal 2.3
  - Support Portlets (JSR-168) via adapter
- uPortal 3.0
  - Implement Portlet Specification (JSR-168)
  - Support IChannel via adapter



# Portal => Application Framework

- Portals are a framework to deploy tools (aka rectangles) and focus on how the user wants to arrange their own “rectangles”
- While Sakai has chosen to use a portal as a component integration technically, the goal is for the tools to work together closely and seem to really be parts of a larger “tool”
- Sakai has a lot of features, (services, presence, notification, etc..) which bridge the gap between portal and application framework



# Sakai 1.0 and uPortal

- The embedded version where the entire Sakai tool set appears as a single channel much like the “SuperChannel”. This can be installed in any standard uPortal environment.
- The “injected” version which uses a modified version of uPortal 2.3 with two-level navigation and configuration information coming from Sakai. This is pretty much a stand-alone learning management system using uPortal. The uPortal theme and structure will be altered to precisely display the hierarchical navigation needed by Sakai.



# Sakai 1.0: Embedded Version (uPortal 2.3)

The screenshot displays the Sakai 1.0 Embedded Version interface. At the top, there are navigation tabs for 'Home', 'Athletics', and 'Sakai'. Below these, a horizontal menu contains 'CS101', 'EE499', 'EE499-Sec01', 'Chess', and 'Motor'. A vertical sidebar on the left lists 'Help', 'Play', 'FAQ', 'Meeting', and 'Admin'. The main content area is divided into two columns. The left column contains a message: 'QuickTime™ and a TIFF (Uncompressed) decompressor are needed to see this picture.' The right column contains a chat window with the following text: 'Fred: He will move P-K4', 'Joe: Nah - he did that last time', and 'Mary: It does not matter what he does - I will beat him again'. Below the chat window is a text input field containing 'Watch me now mary!' and a 'Send' button. A yellow arrow points from the text 'Single Channel' to the chat window.

Single  
Channel





# Sakai 1.0: Injected Version (uPortal 2.3)

Home	CS101	EE499	EE499-s01	Chess
Help	<p>QuickTime™ and a TIFF (Uncompressed) decompressor are needed to see this picture.</p>			Fred: He will move P-K4
Play				Joe: Nah - he did that last time
FAQ				Mary: It does not matter what he does - I will beat him again
Meeting				
Admin				
				Watch me now mary! <input type="button" value="Send"/>

Home	CS101	EE499	EE499-s01	Chess
Help	Play	FAQ	Meeting	Admin
<p>QuickTime™ and a TIFF (Uncompressed) decompressor are needed to see this picture.</p>			Fred: He will move P-K4	
			Joe: Nah - he did that last time	
			Mary: It does not matter what he does - I will beat him again	
				Watch me now mary! <input type="button" value="Send"/>

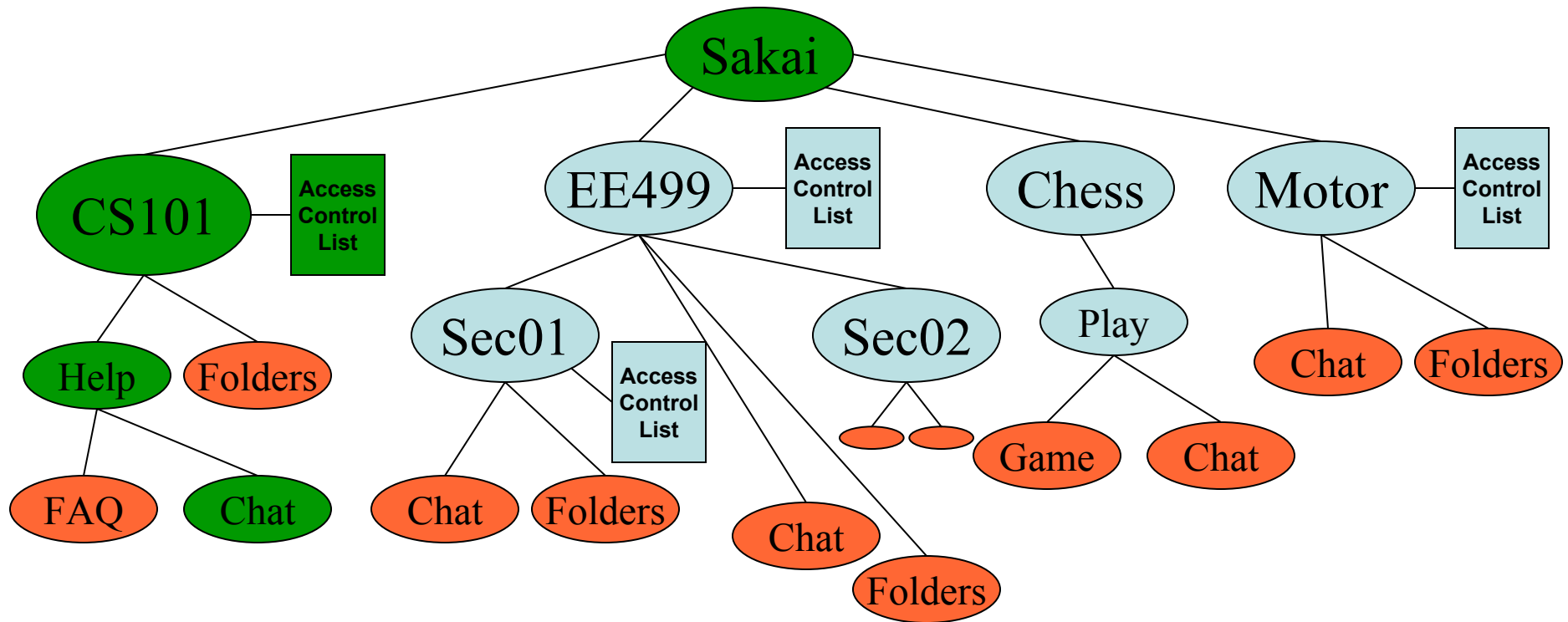


# Sakai 2.0 and uPortal

- The integrated version where Sakai tools simply are part of the set of channels which can be added to any uPortal environment. By placing a Sakai tool anywhere within the navigation hierarchy of uPortal, it becomes a collaborative element at that location.
- This is more complex than it sounds and as such will only work within uPortal and will require some modifications to uPortal that the Sakai effort is undertaking and contributing to the uPortal project.



# The Hierarchy Challenge



Portlets/Channels need to know “where” they fit for inherited access control and to know the “context” in which they operate - “I am the Chat for CS101”. There are fragment administration issues. This is not specified in the JSR-168 spec. SuperChannel and Sakai Embedded are solutions which hide the hierarchy from the portal - but this is less than ideal because it would be nice to drop a context-sensitive “chat” tool anywhere in the portal.

# Sakai 2.0: Integrated

The image displays two side-by-side screenshots of the Sakai 2.0 user interface, illustrating the integration of various tools. Both screenshots show a top navigation bar with buttons for 'MyPage', 'Athletics', 'Events', and 'Courses'.

**Left Screenshot:** The 'Courses' button is highlighted. A sidebar on the left contains a list of course sections: '+ CS101', '+ EE499', '+ Main', '- Sec01', 'Help', 'Chat', 'FAQ', 'Meeting', '+ Sec02', '+ Chess', and '+ Motor'. The 'Chat' tool is selected, displaying a chat window with the following messages: 'Fred: He will move P-K4', 'Joe: Nah - he did that last time', 'Mary: It does not matter what he does - I will beat him again', and 'Joe: What if he pulls his goalie?'. Below the messages is a text input field containing 'Watch me now mary!' and a 'Send' button.

**Right Screenshot:** The 'Courses' button is highlighted. The chat window title is 'EE499 -> Sec01'. To the right of the title are two buttons: 'New Course' and 'New Section'. A vertical navigation menu on the left contains buttons for 'Help', 'Chat', 'FAQ', 'Meeting', and 'Admin'. The 'Chat' tool is selected, displaying the same chat messages as the left screenshot. Below the messages is a text input field containing 'Watch me now mary!' and a 'Send' button.



# Advanced Sakai

QuickTime™ and a  
TIFF (Uncompressed) decompressor  
are needed to see this picture.

QuickTime™ and a  
TIFF (Uncompressed) decompressor  
are needed to see this picture.

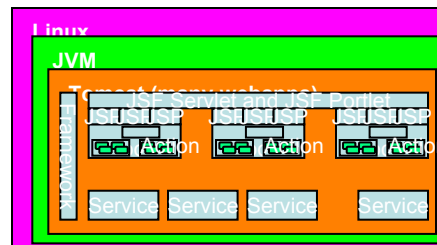
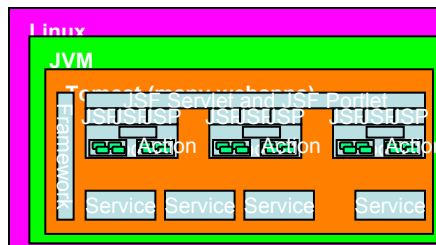
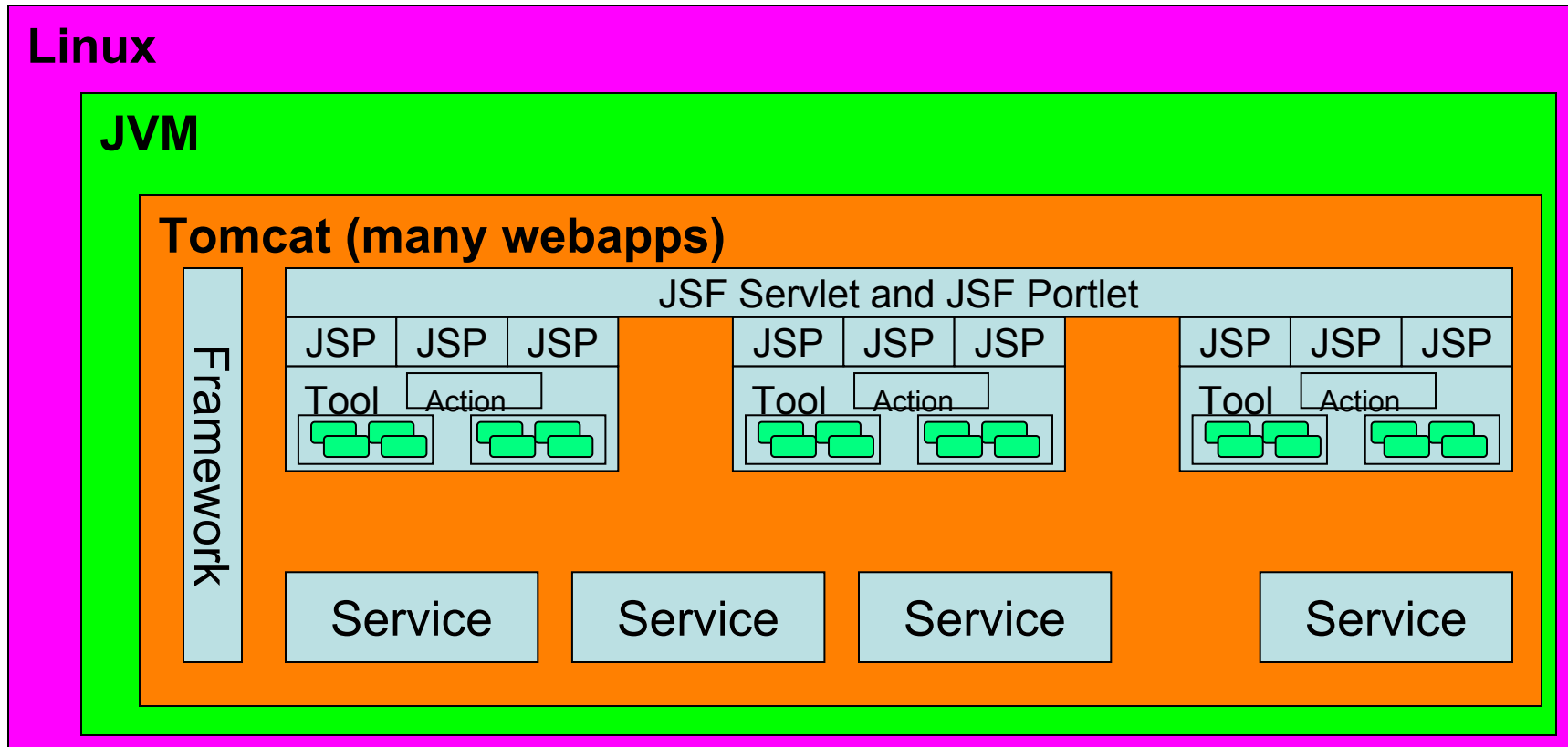


# Sakai Framework Possibilities

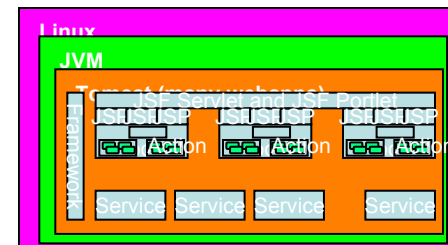
- Web server / Browser
  - This is what we are committed to do in 2 years
- Swing desktop
- Web Services - a few places
- Web Services - everywhere



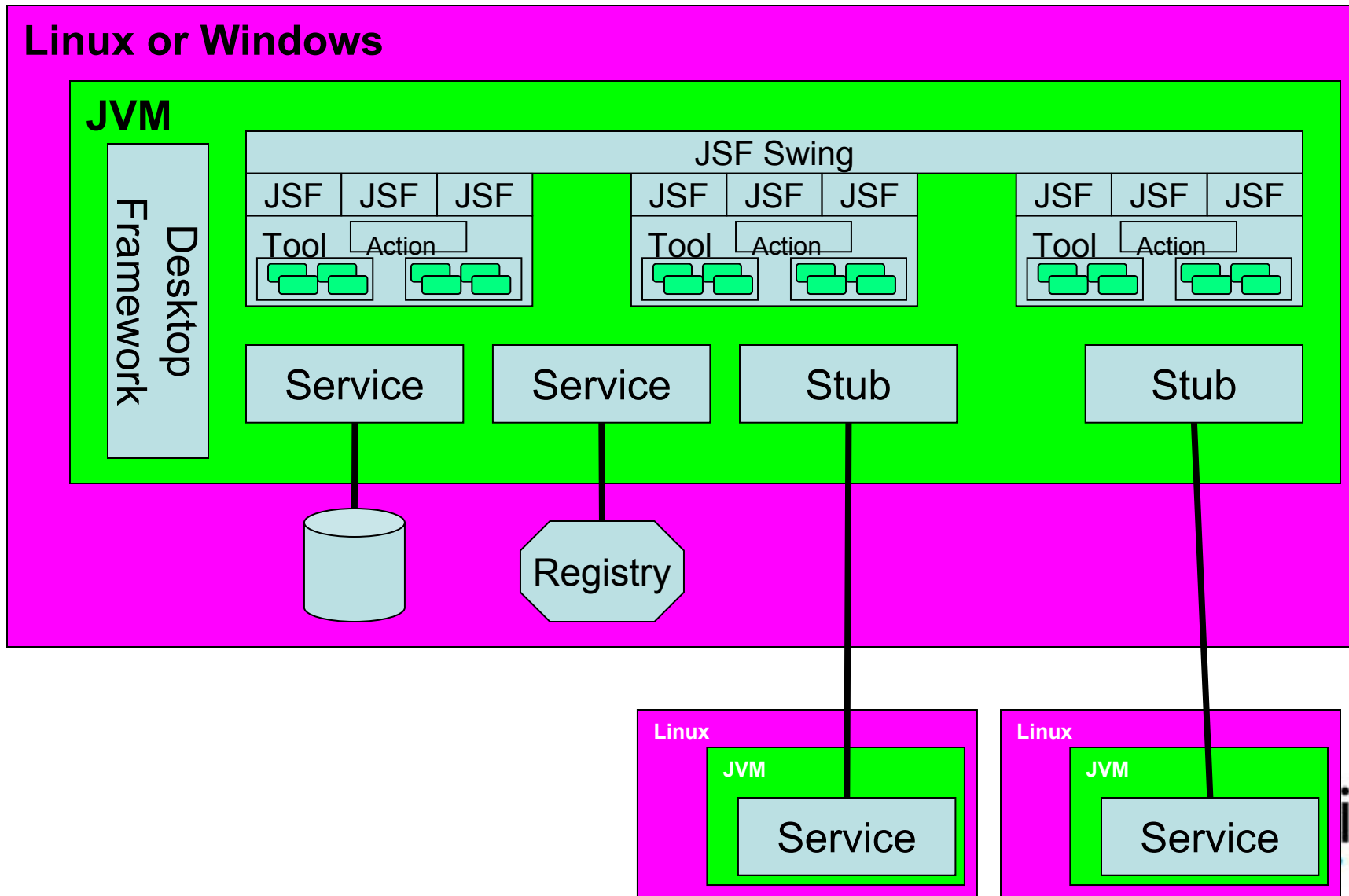
Plan A - Clusters of JVM's JSF implementations from SUN.



...



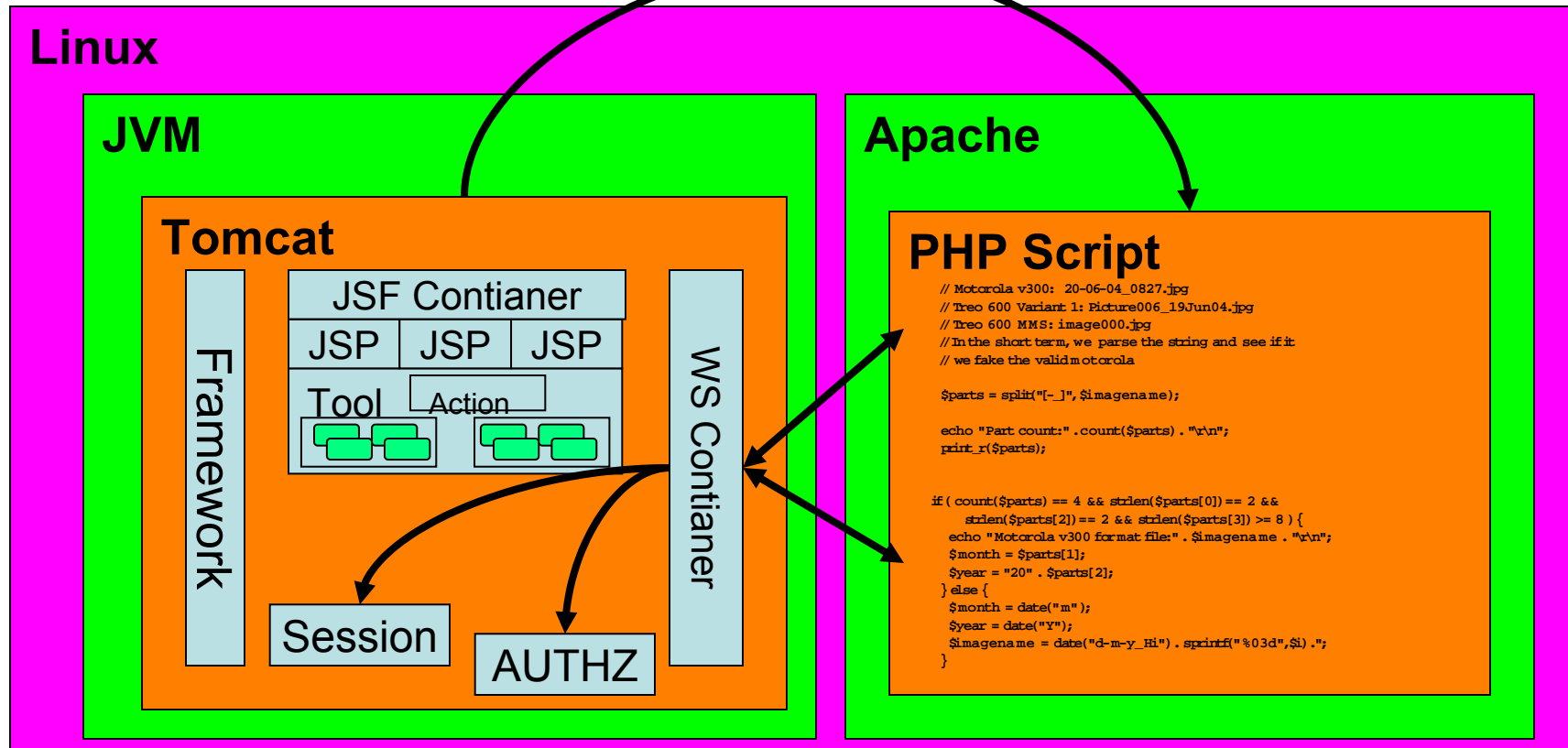
What if SUN provided a SWING JSF Render capability and we hand-build desktop versions of services or hand-build stubs which used ROMI or Web Services?





Web Services and  
Cross Language  
Proof of Concept

Launch preserving  
session/identity



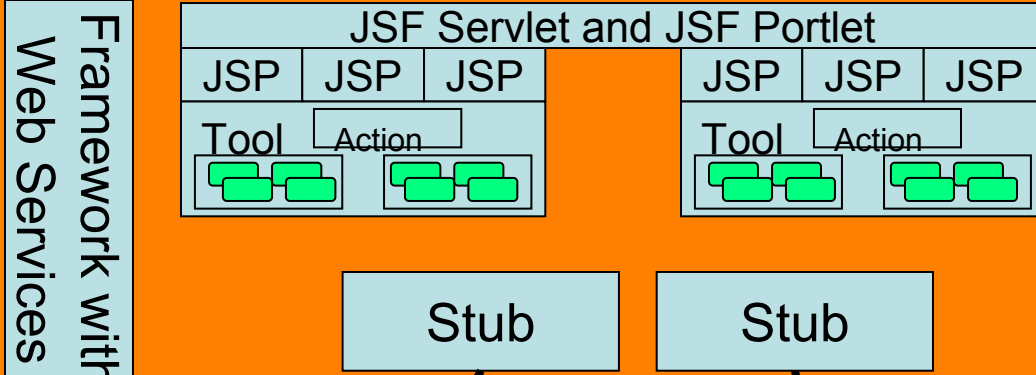
- How do we launch non-JAVA elements passing in basic identity, session information? WSRP? Ad hoc? cWebProxy? Do we include a back-reference handle to help resolve web services?
- How do we secure the web-services calls? What languages support
- Do we refactor services? Do we we implement that critical subset? Do we end up with new methods that are “yucky” but well-suited for web-services?
- Do we hide things in PHP behind an API with methods? Or do we just lay down some web services code in the PHP?



Linux

JVM

Tomcat (many webapps)



Framework with Web Services

Linux

JVM

Axis

Axis Framework

Service

Windows

.NET

.NET Framework

Service

What if we built a version of the framework that examined an interface using reflection and dynamically built a proxy, generated WSDL, and just made web service happen pretty much transparently other than declaring where services were to run in configuration...

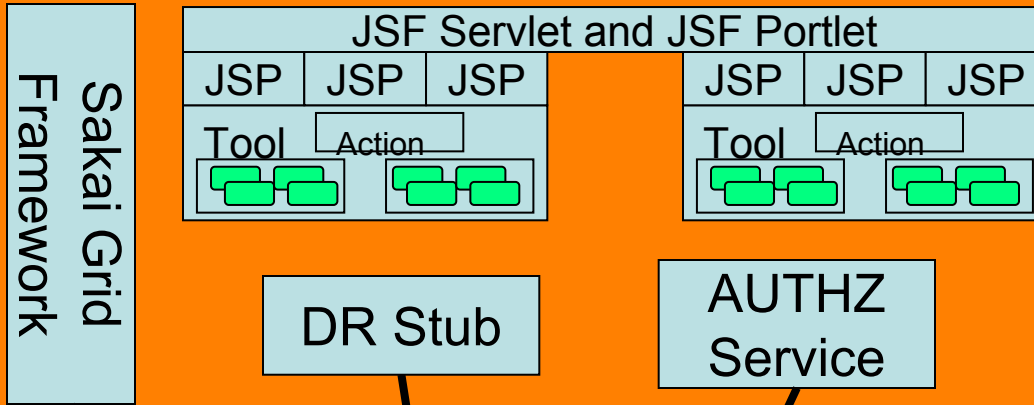
Hopefully there will be a mechanism for secure web services, or perhaps we could simply use two-way SSL certificate exchange to force transport security...



Linux

JVM

Tomcat (many webapps)



Linux

JVM

Axis

Sakai Grid Framework

AUTHZ Stub

DR Service

What if the frameworks were highly coordinated and in addition to dynamically generating stubs and placing web services, provided standardized mechanism for moving identity securely across web services, and the frameworks could perform dependency injection automatically when one service had a dependency on a service running on another server...

Hmmm. Sounds like the Grid.



# Why wait for web services?

- Our APIs and services will not really be mature until early 2005 - we may have to do major re-factoring as our code base grows and problems are identified
- Secure, identity preserving web services at a distance seem to be churning every 6 months.
- We are committed to deliver a full-featured high-performance product in the Java / Web Server / Browser space in two years.
- We don't have time to be the "tip-of-the-spear" on tracking every single web-service technology twitch.
- Web services are great fun for "point solutions" but are painful as a basis for a framework right now



# Why start on web services?

- Short term: Sakai API implementations can use Web Services hidden behind the API (collecting point solutions)
- Web services are changing right now
  - WSRF - Web Services Resource Framework
  - Generic Security Services Application Program Interface (GSS-API) defined in RFC 2853 and JDK 1.4.2
- Service Injection means that it is “Possible” to build a Sakai Web-Services Framework without changing services code.



# Summary

- This a journey - we are just at the beginning
- Thank you for your time
- Sakai is a well funded effort which will product a portal framework which will support both basic JSR-168 portlets and Sakai-style portlets as well.

QuickTime™ and a  
TIFF (Uncompressed) decompressor  
are needed to see this picture.

QuickTime™ and a  
TIFF (Uncompressed) decompressor  
are needed to see this picture.

