

IBM Rational Software Conference 2009  
As Real as It Gets!

**CRMA41: Large Scale Enterprise Deployment of  
(R) Rational Team Concert (TM) 2.0**

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Rational software CRMA41

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## Agenda

- Goals of Presentation
- Rational Team Concert Concepts
- Deep Dive on Rational's Deployment & Self-Hosting
- Best Practices and Lessons Learned
- Recent and Upcoming Enhancements

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## Goals of Presentation

- Use Rational's deployment experience – Over 5,000 users and 250 Projects as an example to ...
  - ▶ Help you think about a Rational Team Concert deployments
  - ▶ Upgrades, including new things to consider with RTC 2.0
  - ▶ Give some suggestions as to possible architectures and configurations
  - ▶ Discuss best practices, pitfalls, and lessons learned

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## Rational Team Concert Concepts

- Simple Configuration
- Repositories vs. Project Areas
- Authentication vs. Authorization
- Private Project Configuration (RTC 2.0)
- 250 Users & Beyond - RTC Edition – Standard vs. Enterprise?
- Multiple RTC Servers / Repositories
- C/ALM RTC+RQM+RRC Test Configurations (RTC 2.0)
- ClearCase / ClearQuest Bridge or Connectors
- High Availability (RTC 2.0 Enterprise)

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## RTC Simple Configuration

- Server Operating System
  - Windows / \*Windows 64
  - Linux / \*Linux 64
  - \*AIX
- Application Server
  - WebSphere Application Server (WAS)
  - Apache Tomcat Application Server
- Database
  - Derby
  - DB2
  - Microsoft SQL
  - Oracle
- Directory Services
- Rational Team Concert

\* RTC 2.0

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## Repositories vs.. Project Areas

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## Authentication vs. Authorization

- Authentication = Mechanism to verify identity
- Repository Authorization = Permission to access a repository
- Client Access License (CAL)
- Process-Level Authorization = Permission to access Project & Team Area resources

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## Authentication

- **Apache Tomcat Application Server (Tomcat)**
  - ▶ Supports authentication using either Tomcat Users or LDAP (but not concurrently)
  - ▶ Tomcat Users
    - Less secure
    - Stores account passwords lightly encrypted on the application server
    - Difficult to manage Password Policies
  - ▶ Other forms of authentication require custom coding
  
- **WebSphere Application Server (WAS)**
  - ▶ Supports Enterprise level authentication
  - ▶ Provides federated repository capability (See Useful [Links](#))
    - Can authenticate with more than one authority (i.e. LDAP(s), AD and local operating system accounts) concurrently



## Repository-level Authorization

- **Repository Roles and Access → Can I get into the server?**
  - ▶ Each role maps to one or more groups (LDAP Groups) in the registry (J2E Roles)
    - JazzAdmins
    - JazzDWAdmins
    - JazzUsers
    - JazzGuests
  
- **Licensing → What can I do when I get there?**
  - ▶ Developer / Floating Developer License
  - ▶ Contributor / Floating Contributor License
  - ▶ Licenses for system processes like Build and Connectors



## Process-level Authorization

- **Process Roles and Access → Within my repository and license permissions, what can I do when I get there?**
  - ▶ This is where teams in Rational take over responsibility from IT...
    - You may choose to give more or less freedom to teams
  - ▶ Configured in the process configuration per Project and Team Area
  - ▶ Access to specific Project Areas – Project level ACLs (RTC 2.0)
  - ▶ Refined access control to components and functionality
  - ▶ Role-Based Process Configurations
  - ▶ Configurations support Timeline / Iteration Based Processes
    - Development Milestone Phase
    - Stabilization Milestone Phase



## Private Project Configuration (new in RTC 2.0)

- **Access Control Options**
  - ▶ Everyone
  - ▶ No one (JazzAdmin only)
  - ▶ Members of the project hierarchy
  - ▶ Members of the project hierarchy plus access list
  - ▶ Members of an access list only
  
- \* Note: Need to configure process roles to control how members of a Private Project will work

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### Private Project Example

The diagram illustrates a private project setup within an RTC Repository. It is divided into two main sections: RTC Project Area A and RTC Project Area B. Each Project Area contains a set of Team Area(s) (Core Team, Web Team, Server Team) and Workitem Category(s) (Core Application, Web Application, Server). Arrows indicate that users from 'RTC Project Area A Users' and 'RTC Project Area B Users' are accessing their respective Project Areas. The RTC Repository is shown at the top with three user icons.

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### Multiple Application Servers

- Multiple RTC Repositories Configured against a single Database server with Multiple Database Instances
- No longer necessary to achieve project isolation (private projects) or more than 250 users (Enterprise Edition)
- Good Candidate for C/ALM Configuration

The diagram shows a multi-tier architecture. At the top, there are multiple Application Servers (OS) labeled 'Application Server A' and 'Application Server B'. Each server contains a 'Rational Quality Manager' and 'Project Area A' and 'Project Area B' with 'Team Area A' and 'Team Area B'. These servers connect to a 'Directory (LDAP)'. Below the servers is a 'DB Server (OS)' containing multiple database instances: 'DB RTC A' and 'DB RTC B'.

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### C/ALM & CC / CQ Bridges and Connectors Topology

- Interoperability between Jazz Foundation Products
- Synchronize and replicate CC & CQ artifacts into RTC
- Bridge workitems with CC & CQ artifacts

The diagram depicts a complex topology for integration. It features two 'Application Server (OS)' instances, 'Application Server A' and 'Application Server B'. 'Application Server A' includes 'Rational Team Concert' and 'ClearCase / ClearQuest Bridge / Connector'. 'Application Server B' includes 'Rational Quality Manager or Rational Requirements Composer'. Both servers connect to a 'Directory (LDAP)'. Below them are 'DB Server (OS)' instances: 'DB(RTC) A' and 'DB(RQM/ RRC)B'. An 'External ClearCase / ClearQuest Environment' is connected to 'Application Server A' via a 'Bridge / Connector'. 'C/ALM' is shown as a central integration point between the two application servers.

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### High Availability – Idle Standby-server

- This Basic HA solution is implemented for purposes of providing a failover server.
- The secondary server only becomes active when the primary server fails.
- It is not a configuration for load balancing.

The diagram illustrates a high-availability setup. It shows two 'Application Server Instance' boxes: 'Primary Server A' and 'Secondary Server B'. Both contain 'RTC Application'. An 'IP Sprayer HTTP Server' is positioned in front of them, with arrows pointing to both. A 'Database RTC Repository' is connected to both servers. The secondary server is shown in a dashed-line state, indicating it is an idle standby.

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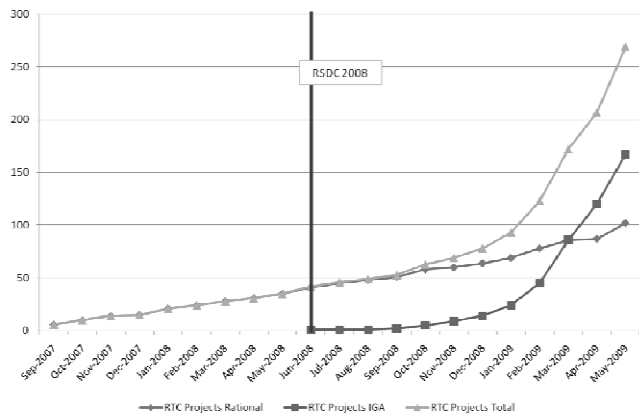


## Deep Dive on Rational's Deployment & Self-Hosting

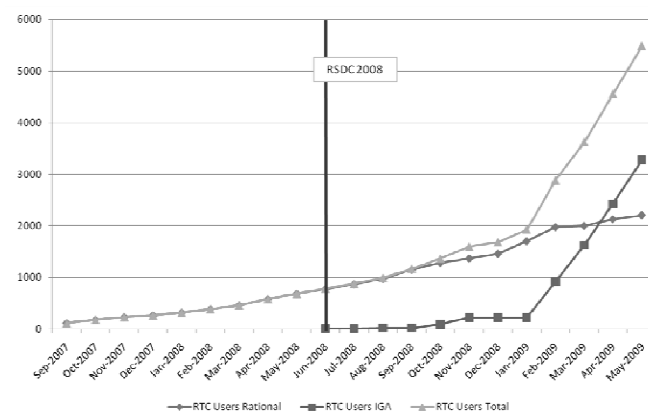
- Numbers and adoption rates over time
- Our Current Topology
- Jazz.net Topology
- Our Authentication & Authorization Story
- How do we maintain availability?
- Upgrades
- Other Aspects of our Environment



## Total Number of Projects Hosted by RES



## Total Number of Unique Users of our Infrastructure



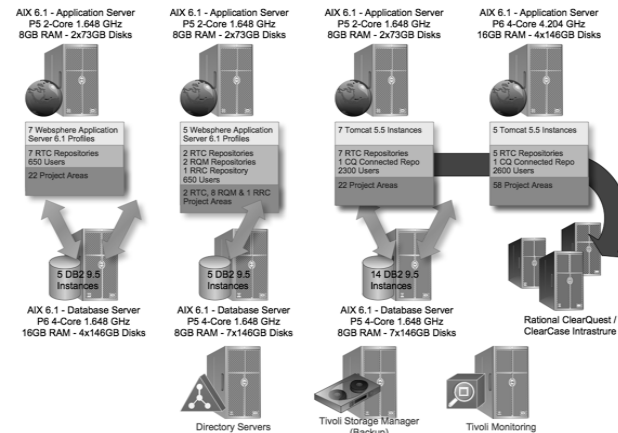


## Current RTC Topology

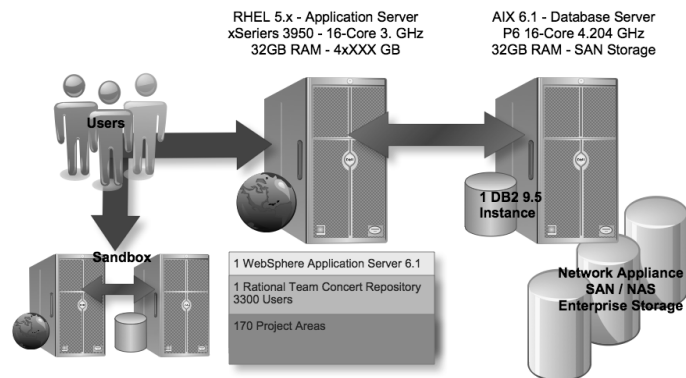
- **Mix of Jazz Foundation Products**
  - ▶ 24 Rational Team Concert Repositories (RSDC 2008 – 10)
  - ▶ 2 Rational Quality Manager Repositories (RSDC 2008 – 0)
  - ▶ 1 Rational Requirements Composer Repositories (RSDC 2008 – 0)
- **Application Servers**
  - ▶ 4 Production Applications Servers Running AIX 6.1 (RSDC 2008 – 1)
    - Combination of Tomcat and WebSphere Application Server (RSDC 2008 Tomcat only)
  - ▶ 1 Production Application Server Running RHEL 5 (RSDC 2008 – All AIX 5.x)
    - WebSphere Application Server
- **Database Servers**
  - ▶ 4 Production Database Servers Running AIX 6.1 (RSDC 2008 – 1)
    - All Running DB2 9.5 (RSDC 2008 DB2 9.1)
- **Self-Hosting ClearCase and ClearQuest Bridges**
  - ▶ 2 Repositories Connected, 5 more in the pipeline (RSDC 2008 – Non in production)
  - ▶ 10+ product teams in use or in the pipeline for connecting to CQ for customer APAR / RFE handling



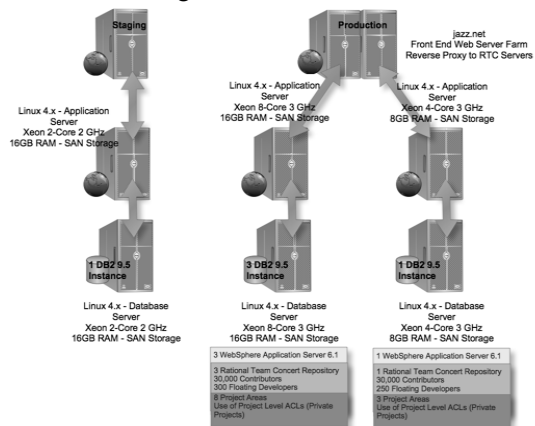
## Rational Internal Deployment – Raleigh, NC



## GBS Internal Deployment – Littleton, MA



## Jazz.net Self Hosting – Toronto, ON





## Our Authentication & Authorization Story

- Enterprise LDAP Environment
  - ▶ Tied to IBM HR Data
  - ▶ Password Management – Aging, Complexity Rules, Lockouts, Resets
  - ▶ Self Service LDAP Group management (JEE Roles)
- User Account Management Tool for Account Requests
  - ▶ Manual Processes outside of RTC
  - ▶ Workflow engine – Audit trail for tracking management approvals
  - ▶ Generates Requests for Adding users to specific Repositories and Projects
  - ▶ Validate quarterly against Project membership
- Central Application Management team owns JazzAdmin Role
  - ▶ Import New users based on request system
  - ▶ Assign CALs – We use a Floating Licenses
  - ▶ Add users to a Community Team in each project (used for quarterly validation)
- Investigating the use of Tivoli Identity Manager for automated account handling



## How do we maintain availability?

- Our Configuration
  - ▶ Not HA at the middleware layer
  - ▶ Solid pSeries & xSeries servers
  - ▶ Intelligent power setup
  - ▶ Solid disk subsystem
  - ▶ Distributed repositories on multiple physical servers
- Monitoring
  - ▶ IBM Tivoli Monitoring 6.2 for OS and DB2
  - ▶ Home Grown Scripts for Application Availability
  - ▶ Rapid notification of Issues via Pager
- Backup / Time to Restore
  - ▶ Nightly database snapshots
  - ▶ Distributed schedule of snapshots per database server that host more than one DB instance, to prevent over taxing the database server
  - ▶ We store 3 copies to NAS storage – Backup to tape using TSM



## Upgrades

- Major version upgrades happen on a preview server
  - ▶ Upgrade based on a previous snapshot and make available prior to production upgrade
  - ▶ Allows for testing of functionality, plug-in compatibility, build configurations
- Upgrade Schedule based on type of deployment
  - ▶ Standard – eGA deployments only
  - ▶ Cutting Edge – Upgrade schedule varies based on RTC milestone / beta release schedule
- We Always perform an offline backup of the repository before an upgrade
- Repository Upgrades vs. Migrations
  - ▶ Upgrades are quick deployments – 30 minute scheduled outages
  - ▶ Migrations require export and import to new version – time can vary based on size of repository – 1 to 20 plus hours (not including backup)
- RTC 1.0.x to 2.0 SCM Considerations – Workspaces are not compatible between versions



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## Best Practices Lessons Learned

- Centralized vs. Distributed Deployments
- System Configuration / Considerations
- Virtualization
- Networking
- Disaster Recovery & Continuity Planning
- Project Partitioning / Process Configurations
- Staffing Considerations
- Other Considerations



## Centralized vs. Distributed Deployments

- Rational's deployment is biased to a centrally managed deployment
  - May be geographically distributed infrastructure
- Allows us a higher level of certainty that Security is being maintained for the critical assets stored in RTC
- Easier to manage continuity / disaster recover plans
- Ensures a well tuned infrastructure environment
- Take advantage of economy of scale
  - System resources – Servers / Storage / Data Center Space
  - Staffing – SME's, SPOC



## System Configuration & Considerations

- Application Server
  - Memory Intensive – Monitor Heap Size
  - ☀ **Consider 1 to 2 GB of RAM per Application Server as a starting point**
  - Fast storage for Reports Temp directory
    - Report snapshots build to temp storage before being stuffed in the data warehouse
    - Users viewing reports build to temp storage
  - Enterprise Edition supports Standby Configuration with WAS
- Database Server
  - Memory, CPU and Disk intensive
  - Configure storage in a High Available configuration – Striped Volumes (RAID)
  - Consider HA options – RTC can utilize it
  - Bulk of the storage, including Source Code and Attachments are stored in the database
  - ☀ **Consider 1GB starting and 250MB per Developer as a starting point**
- High availability configurations require more servers
- Keep Database on same LAN as Application Server



## Virtualization

- Types of Virtualization Supported
  - Application Server
    - WebSphere Application Server Profiles
    - Apache Tomcat Application Instances
  - Database Instances
  - OS Level Images
    - VMware – supported in RTC 2.0
- Considerations for Virtualization
  - Availability – VMware VMotion Technology
  - Partitioning of high-end server to take full advantage of systems resources
  - Consider Database server virtualization closely
    - pSeries LPARs is a solid choice, but other technologies may reduce performance
  - Virtualization is great, but monitor closely to ensure you don't oversubscribe the environment to the point that performance is unacceptable
  - Virtualized images want high performance disk subsystems







## Networking

- Firewalling
  - ▶ Client to Application Server – No problem HTTP(S)
  - ▶ Work with firewall vendor if placing a firewall between the Application and Database Server to ensure supportability
- High latency between the Application and Database Server is not recommended
- End User Proximity to RTC Infrastructure
  - ▶ RTC is well optimized for the WAN
  - ▶ Traffic flows over standard HTTP protocol
- CQ Gateway Placement
  - ▶ Utilizes Team API to communicate with CQ – Not WAN friendly
- LDAP or Directory Infrastructure
  - ▶ If the Application Server can not communicate with the Directory environment then you can't access RTC



## Disaster Recovery & Continuity Planning

- Backup Considerations
  - ▶ Database backups or resiliency
    - Consider nightly online snapshots
      - Schedule snapshots for off peak time
      - Distribute schedule if multiple database instance on a server
  - ▶ Ensure archive logs are enabled
- Application Server Backup Considerations
  - /conf/\* directory (RTC 2.0)
  - Profile backups (for WAS)
  - Tomcat-users.xml (Tomcat)
- RTC Recovery process
  - ▶ Restore the database; roll forward using archive logs
  - ▶ Deploy RTC to your application server
    - Must deploy the same release of RTC that the database snapshot was taken of
    - Rebuild Workitem Index
    - Replace configuration files and reapply licensing files if needed
- Consider a recover site using CNAMEs to redirect traffic



## Project Partitioning / Process Configurations

- Lots of decisions to be made here...
  - Start with a natural mapping of projects to ongoing efforts
    - ▶ Additional timelines to support parallel dev/maintenance efforts
  - Team areas map to sub-teams of the project
  - Work Item categories and SCM components to further categorize work and organize related code
  - Review the Everyone (default) role, you may inadvertently be giving everyone the ability to do things you don't want them to
- ➔see slides: SDP20 – “Getting Started with IBM Rational Team Concert”



## Staffing Considerations

- Centralized or Distributed management
- Who Owns What Responsibilities
  - ▶ Servers / Storage / Tape Libraries
  - ▶ Middleware / Applications
- Security
  - ▶ Corporate Policies
  - ▶ Patches – OS, Database, Application Server, RTC
  - ▶ User Access Validation / Employment Validation
- Account Management
  - ▶ What's your Corporate Directory Services
  - ▶ Who manages the Groups that will map to your J2E Roles
  - ▶ Who is managing Import of IDs and License Allocations for RTC
- End user Support
- Interoperability – Connectors and Bridges
- Migrations





## Other Considerations

- Why would you consider deploying multiple RTC repositories with RTC 2.0?
  - ▶ Consolidating Existing Repositories
  - ▶ Geographically Distributed Teams
  - ▶ Maintenance Windows / Upgrade Flexibility
  - ▶ Different Authentication Realms
  - ▶ Security zones
- Migrating from Other Tool
  - ▶ Know your stakeholders – Moving tools can be painful
  - ▶ Should I ... Import, connect or bridge?
  - ▶ Create Sandbox Environments
    - Test Drive before settling in on a final process configuration
    - Ensure Imports work as planned
    - Ensure Connectors and/or Bridges work as expected



## Other Considerations ... Continued

- Compartmentalization of Sensitive Intellectual Property
  - ▶ Multiple Project Areas for a Single Product
    - Private Project for Source Control Management
    - Public Project for Workitems / Planning / Dashboards
  - ▶ See Jean-Michel's video on using private projects to control source code visibility
- Front End web site for aggregating RTC Instances
  - ▶ Reverse Proxy to RTC Instances
- Establish Rules of the Road Early
  - ▶ Roles and Responsibilities
    - Infrastructure Teams
    - Project Leads
    - SPOC (Single Point of Contact)
  - ▶ Scheduled Outages
  - ▶ Service Level Agreements



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## RTC 1.0.1.1 Enhancements

- Incrementally Supporting Larger Teams
  - ▶ Floating License support – server limits only count against concurrent users
  - ▶ RTC Contributors excluded from server limits
  - ▶ HTTP proxy support – scale and WAN-friendliness
- Native BuildForge Integration

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## RTC 2.0: Enhancements

- Read permissions – private projects
- High Availability
- Support for 64-bit server platforms (Windows, Linux, AIX)
  - ▶ Higher performance OS, increased memory capacity
- Repotools support for users creation and licensing
  - ▶ repotools - createUsers fromFile=users.csv
- Enterprise Edition removes the 250 user limit
- C/ALM integrations
- IBM Developer Cloud

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## 250 Users & Beyond - RTC Edition – Standard vs. Enterprise?

**Standard**

DOWNLOAD

The standard for corporate teams! Installation Manager Web Install for clients, server, and optional components.

Other Download Options...

**Enterprise**

DOWNLOAD

Scalability for the enterprise! Installation Manager Web Install for client, server, and optional components.

Other Download Options...

User limit	250	unlimited
ClearCase / ClearQuest Synchronizer and Bridge	●	●
Floating licenses	●	●
LDAP import	●	●
High Availability		●

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## RTC 2.0 Enterprise Configurations: up to 750 Users - Dual Tier Solution

- 2 IBM System X 3550 Dual CPU Intel Xeon 5160 2.4 GHz or higher 64-bit
  - ▶ Memory - 4GB\* or higher (recommend 8 GB)
  - ▶ Storage – High Performance SAS (15K), RAID, SAN or NAS recommended
  - ▶ Software
    - Operating System – Red Hat Release 5.3 or **Windows 2003 Server**
    - Application Server - **Tomcat 5.5** or WAS 6.1.0. 23 or higher
    - Database - Oracle 10GR2, **DB2 9.1**, DB2 9.5 FP 3b, SQL 2005 and 2009

\* **bold** = Load-Tested Configuration

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## RTC 2.0 Enterprise Configurations: up to 1500 users on latest server technology

- Single Tier - IBM System x3650 M2 - Dual CPU Intel Xeon 5500 2.4 GHz or higher 64-bit
  - Memory - **16GB** or higher
  - Storage - NetApp 3050C provides a Fault Tolerant High Availability solution snapshot backup (near zero downtime backup support)\*
  - Recommend Fiber or iSCSI connection to NAS\*
  - Software
    - Operating System – **Red Hat Release 5.3** or Windows 2003 Server
    - Application Server - **Tomcat 5.5** or WAS 6.1.0. 23 or higher
    - Database - Oracle 10GR2, DB2 9.1, **DB2 9.5 FP 3b**, SQL 2005 and 2009

\* **bold** = Load-Tested Configuration

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## Developer Cloud Within IBM Cloud

**IBM Cloud Strategy**

- Public Cloud with multiple service "on-ramps" for clients, hosted in key centers worldwide
- Common infrastructure to provide computing and storage resources
- Common platform, BSS and OSS services to operate and manage
- Range of IBM and partner services
- Implementation and Hosting Services to build "Private Clouds" for SO data centers, other clients

Common Cloud User Experience - The IBM Cloud Portal

Develop & Test Developer Cloud

Information Protection IBM Info Protection Services

Collaboration Lotus Live!

Desktop Desktop as a Service

Applications On-demand applications (horizontal and vertical industry)

Common Cloud Platform

Operational Support Services Business Support Services Platform Products

Infrastructure Mgmt, Capacity Planning, SaaS Mgmt, Order Mgmt, Account Management, Billing, Systems Management

Infrastructure Security Mgmt

"Compute" Cloud Storage Cloud

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Cloud Sandbox - Mozilla Firefox

Home Control Panel Account

+ Add Resources

Control Panel

Welcome to the Control Panel. You have not created any instances from our Image list. Once you have created instances, you can create and manage them.

For more details on the sandbox, please visit: [https://cloud.ibm.com/docs/sandbox](#)

Step 1

Click the Add Resources button and select an Image.

Images

- Rational BuildForge Management Console (SLES 10 SP2, 32-bit x86) (RationalBuildForgeManagementConsole)
- Rational Team Concert Express on SuSEv10sp1 (32-bit x86)
- Rational BuildForge Agent (SLES 10 SP2, 32-bit x86) (RationalBuildForgeAgent)
- SuSE v10sp2 (32-bit x86) (SUSE10sp2)
- WebSphere Application Server v6.1 for Linux (32-bit x86) (WAS6.1)
- SuSE 10 SP2 with Rails 2.3.2 and Ruby 1.8.7 (32-bit x86) (Rails2.3.2-Ruby1.8.7)
- Rational Quality Manager Demo (SLES 10 SP2, 32-bit x86)

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## 5 mins later -> RTC Running in the Cloud

Rational Team Concert

Craig Conboy | Log Out

AppScanEnterprise

Home Project Areas Dashboards Work Item Iteration Plans Source Control Reports Help

Type to search

Create Dashboard

Fireball Project Dashboard

My Dashboards

Shared Dashboards

Team Velocity

AppScanEnterprise Builds

Community

- 2 Succeeded: Fireball Daily Build 5:00.149 - Success 20 hours ago
- 2 Succeeded: Fireball Daily Build 5:00.148 - Success Yesterday
- 2 Succeeded: Fireball Daily Build 5:00.147 - Success 2 days ago

Current Iteration: Sprint 6 (Fireball)

Sprint 6 Backlog

- Itchy
- Sprint 6 Backlog - Scalability
- Sprint 6 Backlog - VIT
- Product Backlog

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# Questions

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## Concluding Thoughts

- RTC 2.0 Enterprise takes Scaling to a new Level
  - 64-Bit Platform support on the Server
  - HA Options
- Try it out
  - Download a Trial version and give it a Try
  - Basic Deployment can be deployed in an hour
- Private Projects or Project ACLs is a game changer on deployments
- Know your Customer / Stakeholder
- Participate on jazz.net – Great resource



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## Useful Links

- [Jazz.net](#)
- [Enterprise performance and scalability testing](#)
- [DB2 Online Backups](#)
- [WAS Configuration with Federated Realms](#)
- [Using read permissions in RTC 2.0 to protect source code](#)



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