CIT ARCHITECTURE REPORT

FY09Q1

CIT Cross Divisional Architecture Team (CCDAT)

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Cornell University
Ithaca, NY

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CIT ARCHITECTURE RERPORT

Cornell Information Technologies Cross Divisional Architecture Team

FY09Q1—November 17, 2008

INTRODUCTION

The CIT Cross-Divisional Architecture Report is designed to document our technology direction for the next three years. At the core of this report are the technologies that we believe we will be investing in during this time. These technologies represent our architecture "foundation" that are here now and into the future. Also very important are those technologies which we plan to "maintain" for the next three years. The difference between "maintained" technologies and those we plan to "invest" in is that the former will only be upgraded for the sake of fixing bugs. Technologies that are being "maintained" are **not** slated for feature upgrades. Such technologies are still important to our overall architecture but are classified differently to note that (sometime) after the next three years they will likely be moved into an "unsupported" state.

Two other groups of technologies reported on within this document are the technologies due to be phased out sometime during the next three years (moved to an *unsupported* state) and those due to be phased in sometime during the next three years (moved to an *invest* state). This, quite simply, paints a clear picture of which technologies are "coming and going" within CIT during this period.

To help clarify the type of technology each individual item represents, we will categorize all technologies into one of five areas:

Server Side Hardware Technology	Any hardware NOT on the end user's desk. Such hardware usually resides in the server farm, a node room or local server room.
Server Side Software Technology	Any software running on server side hardware technology. This is by far the "biggest" category, and so we break it down further into the following subcategories: • *Core Services* – any software running on a server that is used across multiple applications (i.e, a building block) • *Web Technologies* – any software running on a server that produces content to be consumed by a web browser. • *Applications* – a classic "server" in "client/server" environment where the

	client is NOT a web browser. • *Collaboration* – any software running on a server that is used to provide a collaboration service to the end user. These are usually *Web Technologies* as well, but are listed separately.
Client Side Hardware Technology	Any hardware running on the user's desktop. Most notably, their main computer.
Client Side Software Technology	Any software running on client side hardware technology.
Middleware	A specialized subset of server side software technology. This software usually brokers a connection from some client side technology to another server side technology.

FULLY INVESTED TECHNOLOGIES

The following technologies represent technologies we are fully invested in. Not only do we maintain the current versions of such technologies but we also are planning to obtain and deploy upgrades to these technologies as they become available. There is **no plan** in the next three years to abandon or scale back support for these technologies:

Fully Invested Technologies

Server Side Hardware Technology	
• Commodity Internet Connectivity • Internet-2 Connectivity • Core Routing (Layer 3/OPSF) • WideArea Routing (Layer 3—OPSF/BGP) • Wide Area Optical Transport • Campus Edge Switching (Layer-2 VLAN) • 802.11 a/g wireless • ANSI/TIA-EIA wiring standards • TSM (backup hardware)	• 1Gb Switched Ethernet • 10Gb Switched Ethernet • VRRP/HSRP (1st hop router redundancy) • IPV4 • SNMP • Category 6 UTP • Single Mode Fiber • Multi Mode Fiber • Google Search Appliance • Fiber Channel • Google Search Appliance

Server Side Software Technology	
Collaboration • Confluence • Source Forge EE • JIRA Issue Tracking • Subversion **Web Technologies** • Spring-Based web apps • Checkbox Surveys v4.4.1 • ONSET Surveys v1.8.5 • Flash Media Server • phpBB (discussion boards) • Tomcat v5.5.20 • NetVigil • NetDisco • SFInfo • SFAM • CFEngine • ColdFusion (v7,8) • Cognos Data Manager v8 • www.cornell.edu • Network Quarantine	**Application Servers** • FileMaker Server v9 • CyberTower apps • TomCat v5.5.20 • Procmail • Sendmail • 911 Services • DNSDB • DNS/DHCP • Toad v9.x • DMTools v1 • PeopleSoft App Server • Lyris • NetPrint **Core Services** • Python • Java v1.6 • Solaris 10 • MySQL v.5 • Kerberos 5 • Active Directory • Shibboleth
Client Side Software Technology	
• Carbon Copy Cloner v3 • Deepfreeze (PC) v6.3 • Deepfreeze (Mac) v4.03 • Ghost v8.3 • MS Shared Computer Toolkit	• Active Sync • Entourage 2008 • Outlook 2007 • Spider • Avaya Call Management

FULLY MAINTAINED TECHNOLOGIES

The following technologies represent technologies we are maintaining. There are **no plans** to upgrade features on any of these services—except for bug fixes. Phase out dates for these technologies have not been determined and some may stay in the "maintain" state for years to come after the three year period covered by this report expires.

Fully Maintained Technologies

Server Side Hardware Technology	
• Satellite transmitter (MPG-2/ASI output) • Azzurro Fiber link (MPT-2 sent via Tamberg encoder) • Teragrid Connectivity • 100Mb Switched Ethernet • 10Mb Switched Ethernet • DAS (Direct Attached Storage)	• 802.11 b wireless • Category 3 UTP • Category 5 UTP • Sun Cluster • V-Brick Encoder (for CUTV) • Tamberg Satellite Monitor • NLR Connectivity • PBX (Avaya) • RSA (Facilities & Laser Printing)
Server Side Software Technology	
Core Services • z/OS (Mainframe) • z/VM (Mainframe) • Solaris 9 **Web Technologies** • CommonSpot • VEPlan • Spring-Based Applications • Hyperion Online Reporting (Brio) • CUPeople • Formscape • NOCDOCS • NOCLog • Network Status Page • Incident Management: RT	**Applications** • Purchasing • Finance • SMA • TEL • Natural 4.24 • Adabas 7.44 • PS Human Resources • PS Contributor Relations • PS Student • PS ELM
Client Side Hardware Technology	
• XEROX Laser	
Middlewares	
• Middleware Share	

TECHNOLOGY BEING PHASED OUT

The following technologies represent technologies we are phasing out within the next three years. Phase out "dates" have been estimated by technology owners on a quarterly basis.

Technology Being Phased Out

2009 – Q1	Server Side Software Technologies:

	• Thin Clients with CORBA (such as NUBB) • Incident Management: Vantive
2009 – Q2	*No plans for any phase outs*
2009 – Q3	**Server Side Software Technologies:** • Blackboard v6.2 • CommonSpot v4 • CORBA • First Logic • BlackBoard Learning System v6.2 • Kerberos 4 **Client Side Software Technologies:** • Fat Clients with CORBA (WTL,PEDL,SJP)
2009 – Q4	**Client Side Software Technologies:** • Remedy 7 Web Client • Windows 2000 **Server Side Software Technologies:** • Apache v2.2.3 (Faculty Support Services) • MySQL v5.0.22 • Apache 1.3x (Customer Service) • CUWebAuth 1.x (Customer Service) • Actuate • Calendar UWCAL • Crystal Reports v10 (Kronos 5.1)
2010 – Q1	**Client Side Software Technologies:** • Remedy 7 Fat Client • SideCar **Server Side Software Technologies:** • Remedy 7 Incident Management • Solaris 8 • Single Sign On via LDAP (Server Farm Account Management) • Oracle 9i Enterprise Edition • SAMP • Usenet News • EZ-Remote **Client Side Hardware Technologies:** • EZ-Remote
2010 – Q2	**Server Side Software Technologies:** • ColdFusion v7.0 • CUWebAuth v1.x (Identity Management) • Crystal Reports v10 (Pinnacle 5.4) **Client Side Software Technologies:** • Kerberos v4
2010 – Q3	**Client Side Hardware Technologies:** • iClicker (PC) v5.2.10 • iGrader (PC) v3.3.50

	• iClicker (Mac) v1.2.6 • iGrader (Mac) v1.2.6 **Server Side Software Technologies:** • PHP v5.2, 5.1.4 (Facultly Support Services) • MySQL 4 (Customer Service) • Ruby on Rails v1.8x • Tomcat v3 (IS Infrastructure)
2010 – Q4	**Server Side Software Technologies:** • BlackBoard Learning Systems v7.3
2011 – Q1	**Server Side Software Technologies:** • Video Streaming – Real Networks • Apache v1.x (IS Infrastructure) • Brio • ColdFusion v7 (IS Infrastructure) • CUSSP • Cyrus (Mail client delivery system) **Server Side Hardware Technologies:** **Client Side Software Technologies:** • Desktop Videoconferencing – H.323 Protocol • CUSSP
2011 – Q2	**Server Side Software Technologies:** • Windows Server 2003 (32 & 64 bit enterprise) & VMWare • RedHat Enterprise Linux 4 (32 bit)
2011 – Q3	**Server Side Software Technologies:** • A/V Helix Streaming v11.1.5 • PHP 4 (Customer Service) • Cusspclient • Pinnacle v5.4 • BlackBoard Learning Systems v8
2011 – Q4	*No plans for any phase outs*

TECHNOLOGY BEING PHASED IN

The following technologies are planned to be deployed into production during the next three years. Deployment dates have been estimated by technology owners on a quarterly basis.

Technology Being Phased In

2009 – Q1	*No plans for any phase ins*
2009 – Q2	**Server Side Software Technologies:**

	• Workflow (KEW) • GamePrep (Training & Documentation) • Crystal Reports v11 (Kronos 6.0) • Problem Management: Remedy Action Request System
2009 – Q3	**Server Side Software Technologies:** • Notification (KEN) • Application Development Framework (KNS) • JIRA Issue Tracking (IWS) • BlackBoard v7.3 • Remedy 7.1 Web Client • Remedy 7.1 Incident Management • Apache 2.x (Customer Service) • CUWebAuth 2.x (Customer Service) • Oracle 11g Enterprise Edition • KRONOS Workforce Central • SRRS (SQL Server Reporting Services) **Server Side Hardware Technologies:** • VoIP H.323
2009 – Q4	**Server Side Software Technologies:** • Service Bus (KSB) • MySQL v5.0.51 (Faculty Support Services) • PHP v5.2.5 (Faculty Support Services) • Ruby on Rails 2.x (Customer Service) • LAMP (IS Infrastucture) • PHP (IS Infrastructure) • Perl (IS Infrastructure) • Tidal • Remedy AR System 7.0: Incident Management • Remedy AR System 7.0: Config Management • Remedy AR System 7.0: Change Management **Client Side Hardware Technologies:** • iClicker (PC) v5.2.53 • iGrader(PC) v3.x • iClicker (Mac) v1.4.0 • iGrader (Mac) v1.4.2
2010 – Q1	**Server Side Software Technologies:** • Bamboo Continuous Integration • Identity Management (KIM) • MySQL 5 (Customer Service) • Router Virtualization • ISSU/NSF/SSO • RedHat Enterprise 5 (VMWare) • Solaris 10 (VMWare) • Security Tiers (Datacenter Network & Security) • Oracle Business Intelligence EE 10.1.3.4

	• EnCase • SecurID (OIT Security) • Exchange 2007 • Pinnacle v5.4 • BlackBoard Learning System v8 **Server Side Hardware Technologies:** • Desktop Video Conferencing – SIP Protocol • 802.11n **Client Side Hardware Technologies:** • High Resolution Graphics Displays (Classroom) **Client Side Software Technologies:** • Remedy 7.1 Fat Client
2010 – Q2	**Server Side Software Technologies:** • Windows Server 2008 (32/64 bit enterprise) & VMWare • Oracle GRID control 11.x • ColdFusion v8 (IS Infrastructure) • Cynergy • OBIEE+ • Pinnacle v6.0 • Crystal Reports v11 (Pinnacle 6.0)
2010 – Q3	**Server Side Software Technologies:** • PHP5 (Customer Service) • KualiRICE/Spring Based Apps **Server Side Hardware Technologies:** • Cellular Infrastructure • iSCSI • NAS **Client Side Hardware Technologies:** • 3D Projection (Classroom Technologies)
2010 – Q4	*No plans for any phase ins*
2011 – Q1	**Server Side Hardware Technologies:** • 40Gb Switched Ethernet • 100Gb Switched Ethernet • IPV6 • VoIP SIP **Server Side Software Technologies:** • MySQL v6 (Databases & DB Management Tools)
2011 – Q2	*No plans for any phase ins*
2011 – Q3	*No plans for any phase ins*
2011 – Q4	*No plans for any phase ins*

POTENTIAL ISSUES/CONFLICTS

Given the data reported in this quarter's Architecture Inventory Report, we have identified potential issues that may arise as a result of the introduction and/or removal of technology from our environment. There is no implication that items on this list are "major issues" as they may be the result of simple miscommunication and/or misinterpretation by the architecture committee.

1. IS Infrastructure reports that ColdFusion 7 will be unsupported effective FY11Q1. The Cold Fusion applications group reports that they will be "maintaining" Cold Fusion 7 based applications for all three fiscal years.
2. CUPeople is listed as being "maintained" by IS Infrastructure for all three fiscal years. There are known security problems with this product (with respect to authentication) and our understanding is that a plan for its retirement is underway.
3. KFront and the MVS Dispatchers are listed as "Disinvest" for all three fiscal years. To the committee's knowledge both products are dependent on Kerberos 4 which is listed by the Identity Management group as being unsupported effective Q3FY09.
4. ATSUS Customer Service lists that they will be moving to "unsupported" status with respect to their use of cusspclient effective FY11Q3. This product depends on Kerberos 4 which is listed by the Identity Management group as being unsupported effective Q3FY09.
5. Identity Management lists CUSSP as moving to an unsupported state as of FY11Q1. CUSSP has a dependency on Kerberos 4 (though it also supports Kerberos 5 in certain implementations) which they have listed as being unsupported effective Q3FY09.
6. Data Network Engineering reports that they will begin investing "I" in IPv6 effective FY11Q1. It is not clear what modification(s) to our architecture and applications will need to happen to take advantage of this.

NEXT STEPS FOR ARCHITECTURE COMMITTEE THIS QUARTER

The architecture committee will be looking at the following issues this coming quarter.

Discuss methods of storing information about our architecture.

Currently, this report is created using a manual aggregation of data collected via the Quarterly Business Report exercise. If such a data collection process involved electronic storage of the data in question in a way that permitted queries against such data, we could not only automate a portion of the process by which this report is generated, but we could

begin to investigate ways of defining relationships between architecture components that allows for more intelligent queries about what services are impacted by changes in other services. This effort is loosely tied to the efforts underway to store information about our Products and Services in a relational database.

Ensemble

We have been asked to review the proposed architecture for the Ensemble project. CCDAT has hosted Keshav Santi and Jim Howell on multiple occasions to hear about the proposed plan for implementing Exchange and Active Directory. Our goal is to provide feedback on any architectural impact the plan may have on our existing architecture. At this time we will not be providing any validation that the proposed architecture will meet all requirements, as the Ensemble team has already engaged (or plans to engage) subject matter experts on this topic separately. CCDAT has also been asked to review plans for integrating Shibboleth with the proposed Student Email system(s).

Other Topics

At a recent CCDAT meeting, we asked the committee members what topics they might like to discuss in this forum that might impact our architecture. The items suggested were:

- Cloud computing and virtualization
- Review of DNS practices (some feedback at Active Directory sessions that DNS was not done well for campus?)
- Discussing architectural merits and issues with Red Rover Guest and Red Rover Secure
- Implications of implementing "Tiers of Security" in the Server Farm
- Clustering vs. Load Balancing
- Implications of having all servers on one VLAN
- Should LDAP stay hosted on Solaris or move to Linux?

Our intent is to pick one or more of these topics and discuss this next quarter providing feedback to SRM on our discussions. We welcome input from SRM as to which topics should be prioritized or if there are other topics to be added.

SUMMARY

The CIT Cross Divisional Architecture Team would like to thank all Architecture Inventory representatives for entering data into Confluence for their respective areas so that this report was possible. We would also like to thank Polley and all the directors for their support of this activity!