The Case for the Cloud

The advent of cloud services presents a compelling opportunity to modernize the way that HUIT designs, develops, and deploys applications and services for the Harvard Community. We believe that cloud computing offers an opportunity to:

- Position IT to better enable core Harvard missions of teaching and learning
- The primary role of IT is that of a trusted advisor. The cloud reduces IT overhead and creates efficiencies that enable the delivery of timely, business-focused solutions and innovative services.
- Provides unprecedented flexibility and agility in acquiring and using resources
- The combination of on-demand compute provisioning and continuous, automated code delivery of replaces lengthy, manually intensive deployments and enforces quality standards for services.

Offers an improved means to predict and control IT costs

Cloud resources are “pay-per-use,” so costs are incurred only when instances are active — dramatically reducing capital outlay and ongoing operational costs.

Provides a better way to reliably protect Harvard’s data and information

Cloud providers have the resources to obtain and maintain certification for a vast array of global security standards, and the cloud is a geographically diverse environment that provides improved disaster recovery capabilities and safeguards against service outages and failures.

Is a catalyst to grow the skills and evolve the culture of the IT workforce

We strive to create a productive learning environment for HUIT staff that champions Agile software development practices and prioritizes solving complex business problems over traditional system administration.

The Program

The Cloud & DevOps program was established with the primary goal of migrating 75% of existing applications and all new applications to an external cloud provider over a three-year period. In parallel with migrating applications, equivalent organizational change is required to:

- Build skills, establish a culture of innovation, and transition our workforce from functional silos into service delivery teams
- Provide architectural patterns for application development teams
- Build new DevOps and Cloud Ops service offerings

Communication and Outreach Activities

- Governance: Cloud & DevOps Executive Committee (monthly)
- Community engagement and outreach: Cloud & DevOps Big Group (monthly)
- Website: http://cloud.huit.harvard.edu

Key Program Contacts

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CLOUD & DEVOPS Program Overview

The Approach: Transitioning Staff and Migrating Applications

TRANSITIONING STAFF | This iterative process is based on migration needs and will be executed in phases over the course of the program.

| DEFINE target-state workforce | Identify new roles and number of needed positions |
| Migrate staff from operations to the Cloud & DevOps program | Define training plans and objectives |
| Build migration skills & experience | Establish formal training program and monitor completion rate |
| Transition staff to new roles | Establish mentorship relationships between incoming and transitioning program staff |

MIGRATING APPLICATIONS | Highlighted steps are iterative.

| DEVELOP sourcing strategy | Research and compare cloud vendors against technology requirements |
| CREATE a migration plan | Create app inventory | Determine priority for migration |
| DEVELOP cloud arch patterns | Create architectural principles for cloud patterns |
| DEFINE/implement product roadmaps | Create roadmaps for Network, Security, DevOps, and Cloud Ops |
| DEPLOY applications | Perform technical assessment | Replication application code by pattern |
| DECOMMISSION on-prem infrastructure | Create/execute decommissioning plan |
| PROVIDE operational support | Embed DevOps engineers into service teams for Tier 2 support |

High-Level Plan

Additional planning documents (migration roadmap, detailed approach, current status) can be found at http://cloud.huit.harvard.edu/pages/resources

MIGRATION | FY15
- Define cloud arch pattern framework and initial patterns (LAMP, Java/Tomcat) |
- Pilot select applications to support migration and BCDR objectives (21 apps)
- Map apps into migration waves
- Migrate Wave 1 staff
- Define staff transition process
- Create learning portal & training program
- Expand training program
- Create cloud sourcing strategy (AWS) |
- Create product roadmaps
- Create Cloud Ops v.o |
- ID interim offering for cloud-based DR |
- Create cloud operational support model
- Evolve sourcing strategy of additional IaaS (Azure) and SaaS |
- Investigate file and storage offerings |
- Define data protection strategy |
- Create DevOps Platform v.0 |
- Evolve sourcing strategy |
- Evolve service offerings |
- Investigate SaaS offerings for vended solutions
| FY16
- Create cloud patterns (Java/2EE, Win) |
- Migrate Wave 1 applications (50 apps) |
- Implement DR for critical apps |
- Create framework for mentorship |
- Pilot staff transition process (Wave 1.5) |
- Expand training program |
- Create cloud sourcing strategy framework (AWS) |
- Create product roadmaps |
- Create Cloud Ops v.0 |
- ID interim offering for cloud-based DR |
- Create cloud operational support model |
- Evolve sourcing strategy of additional IaaS (Azure) and SaaS |
- Investigate file and storage offerings |
- Define data protection strategy |
- Create DevOps Platform v.0 |
- Evolve sourcing strategy |
- Evolve service offerings |
- Investigate SaaS offerings for vended solutions
| FY17
- Evolve cloud patterns |
- Migrate Wave 2 applications (71 apps) |
- Implement DR for critical apps |
- Create framework for mentorship |
- Pilot staff transition process (Wave 1.5) |
- Expand training program |
- Evolve sourcing strategy |
- Evolve service offerings |
- Investigate SaaS offerings for vended solutions
| FY18
- Migrate 3 apps |
- Implement DR for critical apps |
- Migrate Wave 3 staff |
- Transition Wave 2 & 3 staff |
- Expand training program

STAFF TRANSITION | FY15
- Define staff transition process
- Create learning portal & training program
- Migrate Wave 1 staff

SERVICE OFFERING | FY15
- Evolve sourcing strategy of additional IaaS (Azure) and SaaS |
- Investigate file and storage offerings |
- Define data protection strategy |
- Create DevOps Platform v.0
- Evolve sourcing strategy |
- Evolve service offerings |
- Investigate SaaS offerings for vended solutions
- Evolve sourcing strategy |
- Evolve service offerings |
- Investigate SaaS offerings for vended solutions
- Evolve sourcing strategy |
- Evolve service offerings |
- Investigate SaaS offerings for vended solutions

BENEFITS | FY15
- 5% of applications migrated |
- Repeatable process models established for migration |
- Foundational architectural principles in place to ensure standardization |
- Lessons learned from pilot migrations inform future approaches |
- Baseline financial model established
| FY16
- 17% of applications migrated |
- Replaces tied to Agile development cycles |
- Cloud-based DR approach both less costly and improves RTO |
- Multi-region availability allows for improved application reliability |
- Automated provisioning and deployment in place for migrated apps |
- 35% of applications migrated |
- QA automation integrated into deployment process, improving speed of deployment validation |
- Mission-critical enterprise applications implemented with automated multi-regional DR, allowing for RTO of minutes
| FY17
- 56% of applications migrated |
- Embedded DevOps engineers significantly improve time-to-deploy |
- Continuous releases (sub-daily) |
- Highly skilled workforce developed to support strategic IT |
- Significant reduction in on-premise data center footprint

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