

This two day workshop introduces a Cloud Reference Model and explores various aspects of Cloud solution design from discovery throughout the lifecycle of a Cloud solution all the way to retirement. Special attention is given to requirements and Cloud utilization analysis, Cloud solution design strategies, and deployment scenarios. Upon completion of this course, students will have an understanding of the Cloud Computing environment and practical experience in designing, developing, and deploying Cloud-based solutions. This hands-on workshop consists of 50% hands-on labs in an actual Cloud Computing development environment, and 50% lecture and discussion. Students should have some hands-on experience developing software, but the focus of the course is upon architecture and design considerations within the Cloud.

Course Objectives:

- **How to create a Cloud Reference Model**
- **Think Strategies for Designing Cloud Solutions**
- **Security in the Cloud**
- **Governing Cloud Computing**
- **Work with Cloud SLAs**

Audience: Information Technology Architects, Developers, and Business Analysts

Prerequisites: Foundational Knowledge in Cloud Computing.

Number of Days: 2 days

<p>1 Cloud Reference Model The Need for a Cloud Reference Model Cloud Infrastructure Cloud Infrastructure - Virtual Machines A Bootable OS Image Defining a "Compute Unit" Instance Templates (Flavors) Launching an Instance in OpenStack Block Storage for Instances Cloud Infrastructure - Cloud Object Storage Additional Data Storage Options Cloud Multi-Tenancy Model Common Characteristics of Multi-tenant Applications The PaaS Platform Google App Engine (GAE) PaaS Overview GAE's Stats Google Cloud Storage The SaaS Platform</p>	<p>Cloud Service Model Implementations Google Compute Engine's Simplified Architecture Google Cloud Platform</p> <p>2 Cloud Services Defining Cloud Services User-Cloud Interaction Cloud Service Characteristics The Typical Cloud Services Application Services Messaging Application Service Email Application Service Cache Application Service Specialized Application Services AWS Analytics Systems Google App Engine (GAE) MapReduce Service Use Cases for MapReduce Jobs Integration Platform as a Service (IPaaS) Storage Services Object Storage</p>
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	Archive Storage		Designing for Cloud Usability
	Relational Storage		Additional Usability Considerations
	NoSQL Storage		5 Adopting Your Very Own Cloud
	Some AWS Storage Services		What Drives Cloud Adoption?
	Data Warehouses in the Cloud		What May Go to the Cloud?
	Cloud Utility Services		Capacity Planning
	Scalability and HA of Your Applications in the Cloud		Critical Run-time and Storage Parameters
	The Auto-scaling Service		Pre-Cloud Stages
	Monitoring Services		Cloud Stages
	Configuring Instance Health Check in AWS		Cloud Adoption Steps
	Microsoft Azure Services		Identify your business drivers (Step #1)
	Comparing Cloud Service Stacks		Get Educated (Step #2)
3	Cloud Development		Get Educated (Things to Avoid ...)
	Common Pitfalls for Cloud Developers		Articulate a Value Proposition (Step #3)
	Ephemeral Storage?		Define one or more scenarios (Step #4)
	Cloud Development Stacks		Produce a Road Map (Step #5)
	AWS Toolkit for Eclipse		Gain Stakeholder Buy-in (Step #6)
	AWS Explorer		Establish Governance (Step #7)
	AWS Toolkit for Visual Studio		Invest in Infrastructure (Step #8)
	Creating Services for Google		Cloud Pilot (Step #9)
	Testing Google Cloud Services		Scoping the Pilot Project
	Consuming Google Services		Pilot Project Scope (Contd)
4	Cloud Design Strategies		Enterprise Roll-out (Step #10)
	Implications of Vendor Lock-In		Start Small and Grow Incrementally
	Dealing with Vendor-specific Service API		Amazon WS Technical Lessons When Moving To the Cloud
	Know Your Cloud Application's Needs	6	Designing Cloud Solutions
	Data Physics		Getting Started
	Cloud Design Strategies		Analyzing Cloud Requirements
	Designing for Scalability		"Good/Not-so-Good" Use Cases for the Cloud
	Designing for Cloud Availability		Design the Cloud Service Interface
	Designing for Failure		Designing for Cloud Non-Functional Requirements
	Designing for Cloud Security		Practical Observations and Rules
	Stepping Across Site Silos		Analysis and Design (A&D) Best Practices
	The OpenID Protocol		A&D Best Practices - Prototyping
	SAML vs OpenID		A&D Best Practices – System Partitioning
	History of OAuth		A&D Best Practices - Leveraging Cloud Platform Services
	Stepping Across Site Silos – OAuth		Using Asynchronous Communication Patterns
	Designing the Right Storage		MOM to the Rescue
	Designing for Cloud Management		
	Designing for Cloud Maintainability		
	Other Considerations		
	Designing for Cloud Service Reuse		
	Designing for Cloud Agility		

	Preempt Possible Data Corruption		Access Control: Authentication & Authorization
	Caching		Federated Identity Management
	Staying Hands-On		Access Control: Auditing
	Be Aware of the CAP Theorem		Identity Management
	Constraints		AWS Identity and Access Management Service
	The CAP Triangle		Security in the Google Cloud
	Cloud Layering		GAE Cloud Security Module
	Content Services		Application Security
	Separate Static Content from Dynamic Content		Application Multi-Layer Security Design
	Logic Services		Access Control List Extensions
	Orchestration in the Cloud		Information and Data Security
	Creating Services for OpenStack		Data-at-rest Security
	Creating Applications for OpenStack		Amazon S3 Security
	Testing OpenStack Solutions		Network Security
	Consuming OpenStack Solutions		Operational Security
	Utility - Security Services		DevOps Security Concerns
	Architecting for HA in AWS		9 Cloud Standards
	Handling Error Messages in the Cloud		What Exactly Are We Standardizing?
7	Designing Cloud Web UIS		Standardizing on a Definition
	Main User Interface Types		Why Standardize?
	Other User Interface Types		imple Concept, Difficult Implementation
	Primary UI Considerations		Perspective #1 Turf Wars
	Additional UI Considerations		Turf Wars
	Real-time Considerations		Other Groups Defining Standards
	Social Network Considerations		Recent Progress
	Cloud Client and Web User UIs		Perspective #2 Let the Market Decide
	Data Transportation Considerations		Standardization is Restrictive not Creative
	Emerging Standard - the WebSocket Protocol		Fostering Creativity
	Mashups in the Cloud		Survival of the Fittest
8	Cloud Security		OpenStack Foundation Model
	The Heartbleed OpenSSL Bug		Perspective #3 The Simple View
	Cloud Vendor Security Certifications		Standards to Date
	Google Compute Engine Data Security		OCCI Details
	Cloud Access Security Features		OCCI Client Handshake
	Security of Cloud Vendor Networks		OCCI Server Response
	Insecure Interfaces		OCCI Cloud Infrastructure Categories
	Top Threats for Cloud Computing		Best Practices for Working with Cloud Standards
	The Common Cloud Security Concerns		10 Cloud Governance
	Authorization and Data Access		IT Governance
	Constraints		Unmanaged Clouds
	Cloud Security Domains		Defining Cloud Governance
	The CIAs of Security		
	Access Control: Physical Security		

- An Internal Service Registry and Repository
- Cloud Risks to Consider
- Top Cloud Computing Consumer Risks
- Top Cloud Computing Provider Risks
- Risk Mitigation
- Governance and Risk Mitigation
- Roles and Responsibilities
- Policies and Procedures
- Governing Cloud Services
- Business alignment
- Asset Ownership
- Contract-driven Services
- Agile IT in the Cloud
- The Cloud Systems Checklist
- Capacity Planning Concepts and Challenges
- Governance Best Practices
- Governance Gotchas
- 11 Cloud SLAS**
- What is an SLA?
- Two SLA Management Phases
- Some SLA Parameters
- The Importance of Cloud SLAs
- Amazon Storage SLAs
- Understanding your SLA
- Assess Consequences for Your Business
- Characteristics of a Service Quality Metric
- Service Quality Metrics
- SLA Monitoring Components