CPET 581 Cloud Computing:
Technologies and Enterprise IT Strategies

Lecture on
Cloud-Based IT Project:
from the Needs to
System Requirements and Specifications

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A Specialty Course for Purdue University's M.S. in Technology Graduate Program: IT/Advanced Computer App Track

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References

1. B. S. Blanchard, *System Engineering Management*, 4th Ed, Wiley, 2008.
2. IEEE Recommended Practice for Software Requirements Specifications, IEEE Std 830-1998
3. K. W. Wiegers, *Software Requirements*, 2nd, Microsoft Press
4. S. Robertson and J. Roberson, Mastering the Requirements Process, 3rd Ed., Addison Wesley
5. B. Holtsnider and B. D. Jaffe, **IT Manager's Handbook**, 2nd Ed, Morgan Kauffman Publishers

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Distinguishing, Evaluating, and Selecting Cloud Service Providers,
by Gartner Jessica, http://www.slideshare.net/GartnerJessica/distinguishing-
evaluating-and-selecting-cloud-service-providers
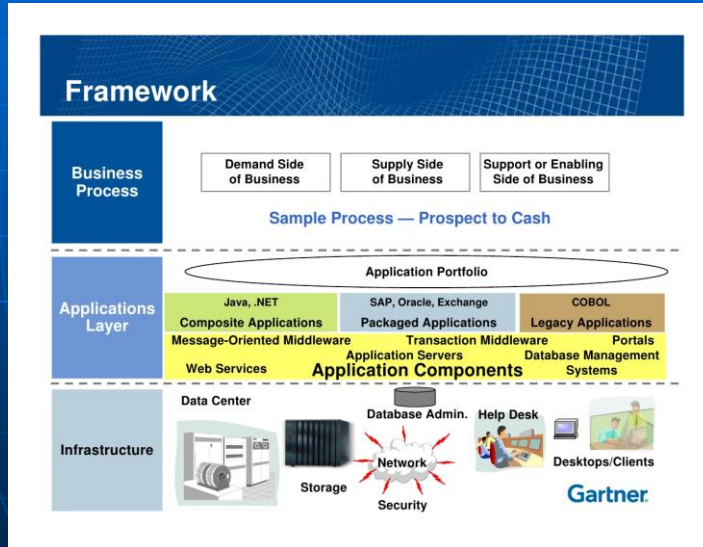
The Three Tier Cloud Framework

- **Business Processing/Apps: Demand side, Supply side, Support or Enabling side**
- **Application Layer**
- **Infrastructure**
  - **Data Center**
  - **Storage**
  - **Network**
  - **Security**
  - **Database Admin**
  - **Help desk**
  - **Desktop/Clients**

The Three Tier Cloud Framework

- **Business Processing/Apps: Demand side, Supply side, Support or Enabling side**
- **Application Layer**
  - **Application Portfolio**
    - **Composite Apps: Java, .NET || Packaged Apps: SAP, Oracle, Exchange || Legacy Apps: COBOL**
    - **Application Components**
      - **Web services**
      - **Middleware: Message-oriented, Transaction, Portal**
      - **Application Servers**
      - **DBMS (Database Management Systems)**
- **Infrastructure**

Iterative Cloud Project Development

- Conceptions
- Business Project Event Lists
- Business Analysis
- Product Evaluation and Determination
- Requirement Definition
  - Software
  - Hardware
  - Networking
  - Etc
- Develop/Construct Product

Iterative Cloud Project Development

- Conceptions
  - New workflows, rules to drive new business value
  - Increase sharing of resources, peak demand planning, cost reduction, Innovation and services…
- Business Project/Problem/Event List
  - Priority
  - Scoping the Business Problem
  - Work Investigation
  - Business Analysis
  - Requirements Definition

Cloud Project - Conception

- **Cloud Business Summit**, Nov. 12, 2014, The Yale Club of NYC, http://cbs2014.saugatucktechnology.com/
- **Opening Keynote**: Digital Business – Rethinking Fundamentals, Speaker: William S. McNee, Founder and CEO at Saugatuck Technology
- **Featured Presentation**: The Emerging Intercloud: Enabling the Internet of Everythings, Speaker: Kit Beall, VP Cloud and Managed Services at Cisco [Cloud of Clouds]
- **Panel**: CIO Panel – Technology, Vision and Leadership: The Digital Business Era, Key issues include:
  - How can IT leaders optimize traditional and emerging resources, internally and externally?
  - How should IT leaders rethink getting work done and delivering operational excellence?
  - What changes must be made to realize the enormous potential of Digital Business?

Cloud Project - Conception

Cloud Business Summit, Nov. 12, 2014, The Yale Club of NYC, http://cbs2014.saugatucktechnology.com/

- **Panel**: CFO/CIO Panel – Farming Digital Business Success
- **Fireside Chat**: Digital Business Means Re-thinking, Re-engaging, and Re-inventing, with Tim Minahan, CMO at SAP Cloud
- **Panel**: Cloud Infrastructure and DevOps: Accelerating Innovation
- **Featured Presentation**: What Digital Business Need in Mission-Critical Enterprise Cloud

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Cloud Project - Conception

Cloud Business Summit, Nov. 12, 2014, The Yale Club of NYC, http://cbs2014.saugatucktechnology.com/

- **Panel**: Cloud Business Solutions – New Synergies
  - **How are apps evolving to enable Digital Business?**
  - **What innovative solutions have been enabled by mobile and social synergies?**
- **Fireside Chat**: Turbo-Charging Digital Business with a Cloud-First Strategy, With Bethann Cregg, Vice President, Information and Analytics Group Cloud at IBM
- **Panel**: CMO/CIO Winning in a Data Rich World
- **Fireside Chat**: Customer Engagement in a Bricks-and-Mortar - Digital World
- **Panel**: Digital Expectations Shaping the Future Business – and IT

Scoping the Business Problem

- What do you want to achieve?
  - Purposes:
    - Business areas to be improved
    - How this work relates to the world around it
  - Advantage
  - Measurement
- Constraints
  - Solution constraints
  - Project constraints
- Naming Conventions and Definitions
- How much is this going to cost
- Early Assessment of Risks
- Blassoff Meetings

Scoping the Business Problem

- How much is this going to cost?
  - Preliminary cost estimation
- Early Assessment of Risks
- Blassoff Meetings
  - Reached a **reasonable agreement** on business reasons for doing the Cloud Project
  - Determined **the scope of the business area** to be studied
  - Determined that there is **a Clear and Measurable Benefits** to be gained by doing the Cloud Project
  - Agrees that the cloud project is **worthwhile and valuable** for the business to make investment,
  - The organization is **capable of building and operating** it
- To Go || Not To Go

Business Analysis
by Business Analysts

- Context:
- Business Use Cases
  - Learn and understand its functionality
  - Make correct response to a business event
  - Assign a Requirement Analyst to each of Business Use Cases
  - Scenarios, Use case workgroups
  - Discovering the Requirements
- Data dictionary
- Stakeholders
  - Identify the Principal Stakeholders
    - Who have interest of the project,
    - who have knowledge pertaining to the project

Business Analysis
by Business Analysts

- Stakeholders
  - **Identify the Principal Stakeholders**
    - The Sponsor
    - The Customers
    - The Key Users
    - The Lead Requirements Analyst
    - Technical Experts
    - Business Experts
  - **Other Stakeholders**
    - Consultants, Management, Subject-matter experts, Core Team, Legal experts, Industry standard setters, Public opinion, Government, Special interest groups, Cultural experts, Adjacent system

Cloud Services Requirements/Evaluation

- Cloud Computing System Requirements
  - Hardware requirements
  - Networking requirements
  - Software requirements
- **Compute**: Required, Preferred, Optional
- **Storage**: Required, Preferred, Optional
- **Network**: Required, Preferred, Optional
- **Security and Access**: Required, Preferred, Optional
- **Service Offerings**: Required, Preferred, Optional
- **Support and Service Levels**: Required, Preferred, Optional
- **Management and DevOps**: Required, Preferred, Optional
- **Price and Billing**: Required, Preferred, Optional

Cloud Services Requirements/Evaluation

- Guide for Evaluating Service & Security of Cloud Service Providers, Lehigh University, http://lts.lehigh.edu/services/explanation/guide-evaluating-service-security-cloud-service-providers
- **Access Privileges**
- **Regulatory Compliance**
- **Data Provenances**
- **Data Segregation**
- **Data Recovery**
- **Monitoring and Reporting**
- **Business Continuity**

Cloud Infrastructure (IaaS) Requirements

7 Requirements for Building your Cloud Infrastructure, by Sheng Liang, Dec. 2010http://www.cio.com/article/2412506/cloud-computing/7-requirements-for-building-your-cloud-infrastructure.html

1. **Heterogeneous systems support**
2. **Service management**
3. **Dynamic workload and resource management**
4. **Reliability, availability and security**
5. **Integration with data center management**
6. **Visibility and reporting**
7. **Administrator, developer and end user**

Requirements Definition

- Business Use Cases (understand user requirements)
  - Use cases and usage scenarios
  - Identify use cases
  - Document use cases
  - Use cases and Functional requirements
- Scenarios, Workgroups
- Use story (understand user requirements)
- Functionality to be included
- Functionality to be specifically excluded

Requirements Definition

- Product Vision and Project Scope Documentation
  - Business requirements
  - Vision for the Solution
  - Scope and Limitations
  - Business Context
- Product Use Cases (PUCs) Scenarios
  - Scenario 1
  - Scenario 2
  - …
  - Scenario n

Requirements Definition

- Requirement discovery/investigation (understand the real problem, uncovering the essence of the system)
  - Usability, Operations, Security, Management, etc
- Modeling Requirements
  - Use Cases (UML)
    - Use Case: Case Name
    - Actors
    - Description
    - Type
    - Includes
    - Extends
    - Cross Refs
    - Dependent Use Cases

Requirements Definition

- Modeling Requirements
  - Use Cases (UML)
  - System Domain Model (Classes, Objects, Relationships)
  - Scenarios and Sequence Diagrams
  - System State Diagrams

Requirements Definition

- Requirements Specifications
  - An unambiguous and testable manner
  - The essence of the requirement has been captured and communicated
  - Ensure that requirements can be quantifies, or measures
  - Ensure that the deliverable product can be tested
  - Observation
  - Measurement
  - Etc
- Reviewing and Validating Requirements
- Sign off Requirements
- Requirement Management

Requirements Definition

- Requirements Specifications
  - SRS Template (Software Requirement Specification)
  - IEEE Standard 830-1998 (Recommended Practice for Software Requirement Specifications)
- Software Requirements Specifications (SRS)
- Reviewing and Validating Requirements
- Sign off Requirements
- Requirement Management

Requirements Definition

- Software Requirements Specifications (SRS) – IEEE Std 830-1998 Template
- 1.Introduction
  - 1.1 Purpose
  - 1.2 Scope
  - 1.3 Definition, Acronyms, and Abbreviations
  - 1.4 References
  - 1.5 Overview
- 2. Overall Description
  - 2.1 Product Perspective
    - Describe the context for the product
    - System diagrams, Data flow diagrams, Block diagrams

Requirements Definition

- Software Requirements Specifications (SRS) - continue
- 1.Introduction
- 2. Overall Description
  - 2.1 Product Perspective
  - 2.2 Product Functions
  - 2.3 User Characteristics
  - 2.4 Constraints
  - 2.5 Assumptions and dependencies
- 3. Specific Requirements

Requirements Definition

- Software Requirements Specifications (SRS)
- 1.Introduction
- 2. Overall Description
  - 2.1 Product Perspective
  - 2.2 Product Functions
  - 2.3 User Characteristics
  - 2.4 Constraints
    - A) System Interfaces
    - B) User Interfaces
    - C) Hardware Interfaces
    - D) Software interfaces
    - E) Communication interfaces
    - F) Memory
    - G) Operations
    - H) Site Adaptation Requirements

Requirements Definition

- Software Requirements Specifications (SRS) - continue
  - 3. Specific Requirements
    - 3.1 External Interfaces
    - 3.2 Functions
    - 3.3 Performance Requirements
    - 3.4. Logical Database Requirements
    - 3.5 Design Constraints
      - 3.5.1 Standards Compliance
    - 3.6 Software System Attributes
      - 3.6.1 Reliability
      - 3.6.2 Availability
      - 3.6.3 Security
      - 3.6.4 Maintainability
      - 3.6.5 Portability

Requirements Definition

- Software Requirements Specifications (SRS) - continue
  - 3. Specific Requirements
    - ….
    - 3.7 Organizing the Specific Requirements
      - 3.7.1 System Mode
      - 3.7.2 User Class
      - 3.7.3 Objects
      - 3.7.4 Feature
      - 3.7.5 Stimulus
      - 3.7.6 Response
      - 3.7.7 Functional Hierarchy
    - 3.8 Additional Comments
  - 4. Supporting Information

Requirements Definition

- Requirements Specifications
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- Sign off Requirements
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System Specification [1]

- 1.0 Scope
- 2.0 Applicable Documents
- 3.0 Requirements
  - **3.1 General Description of System Architecture**
  - **3.2 System Characteristics**
  - **3.3 Design and Construction**
  - **3.4 Design Data and Database Requirements**
  - **3.5. Logistics**
  - **3.6 Interoperability**
  - **3.7 Affordability**
- 4.0 Test and Evaluation
- 5.0 Maintenance and Support (Life Cycle)
- 6.0 Quality Assurance
- 7.0 Customer Service

System Specification [1]

- 1.0 Scope
- 2.0 Applicable Documents
- 3.0 Requirements
  - **3.1 General Description of System Architecture**
  - 3.1.1 System Operational Requirements
  - 3.1.2 Maintenance Concept
  - 3.1.3 Technical Performance Measures (TPMs)
  - 3.1.4 Functional Analysis (System Level)
  - 3.1.5 Allocation of Requirements
  - 3.1.6 Functional Interfaces
  - 3.1.7 SOS Interfaces (System-of-System)
  - 3.1.8 Environmental Requirements

System Specification [1]

- 3.0 Requirements
  - **3.1 General Description of System Architecture**
  - **3.2 System Characteristics**
  - 3.2.1 Performance Characteristics
  - 3.2.2 Physical Characteristics
  - 3.2.3 Effectiveness Requirements
  - 3.2.4 Reliability
  - 3.2.5 Maintainability
  - 3.2.6 Usability (Human Factors)
  - 3.2.7 Supportability
  - 3.2.8 Transportability/Mobility
  - 3.2.9 Producibility
  - 3.2.10 Disposability

System Specification [1]

- 3.0 Requirements
  - **3.1 General Description of System Architecture**
  - **3.2 System Characteristics**
  - **3.3 Design and Construction**
  - 3.3.1 CAD/CAM/CAS Requirements
  - 3.3.2 Materials, Processes, and Parts
  - 3.3.3 Hardware
  - 3.3.4 Software
  - 3.3.5 Electromagnetic Radiation
  - 3.3.6 Interchangeability
  - 3.3.7 Flexibility/Robustness
  - 3.3.8 Workmanship
  - 3.3.9 Safety
  - 3.3.10 Security

System Specification [1]

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  - 3.3.8 Workmanship
  - 3.3.9 Safety
  - 3.3.10 Security

System Specification [1]

- 3.0 Requirements
  - **3.1 General Description of System Architecture**
  - **3.2 System Characteristics**
  - **3.3 Design and Construction**
  - **3.4 Design Data and Database Requirements**
  - **3.5. Logistics**
  - 3.5.1 Supply Chain Requirements
  - 3.5.2 Spare, Repair Parts, and Inventory Requirements
  - 3.5.3 Test and Support Equipment
  - 3.5.4 Personnel and Training
  - 3.5.5 Packaging, Handling, Storage, and Transportation
  - 3.5.6 Facilities and Utilities
  - 3.5.7 Technical Data/Information
  - 3.5.8 Compute Resources (Software)

Requirements Management Tools

- IBM Rational DOORS, http://www-142.ibm.com/software/products/us/en/ratidoor/
  - Webcast: A Preview of IBM Rational DOORS Next Generation, 10/16/2012, http://rational-ug.org/content-library/m/files/466.aspx
- IBM Rational Rose Tools, http://www-142.ibm.com/software/products/us/en/ratirosefami
- CASE Spec – Advanced Requirements Management Tools, http://www.analysttool.com/solutions/index/
- Optima Trace, http://www.componentsource.com/products/optimal-trace-enterprise/index.html
- RTIME, http://www.sdlctools.com/index_files/product1a.asp

Project Management

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