Cloud Solutions – Infrastructure, Platform or Software: Where should you go?

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Agenda

- Introduction
- Cloud Computing Overview
- Application Migration - Picking the right 'As a Service'
- Case Study
- Discussion and Final Thoughts

Introduction

- Cloud Computing as defined by the National Institute of Standards (NIST)
  - *"Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g. networks, servers, storage, applications and services) that can be rapidly provisioned and released with minimal management effort or service provider interactions"*

Introduction

- Cloud computing is a paradigm that opens the door for utility computing
- Instead of investing in hardware, software, and infrastructure – organizations can access through the cloud on an as needed basis

 | *Decades of Cost Management Excellence*

Application Comes with Management and Planning Challenges

- How does an organization determine the right solution to migrate to (or host in) the cloud
- How do they identify the right platform for migration?
- What challenges do the various cloud solutions present?
  - Infrastructure as a Service (IaaS)
  - Platform as a Service (PaaS)
  - Software as a Service (SaaS)
- This paper
  - Describes cloud computing
  - Defines the different solutions
  - Explains the implications of each
  - Presents a case study which proposes analysis of ‘same’ capability migrated to IaaS, PaaS, SaaS

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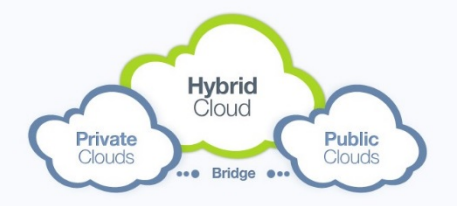
Cloud Computing Overview

Cloud Computing Overview

- According to NIST, cloud computing delivers five essential characteristics
  - On demand self service
  - Broad network access
  - Resource pooling
  - Rapid elasticity
  - Measured services

Cloud Computing Platforms

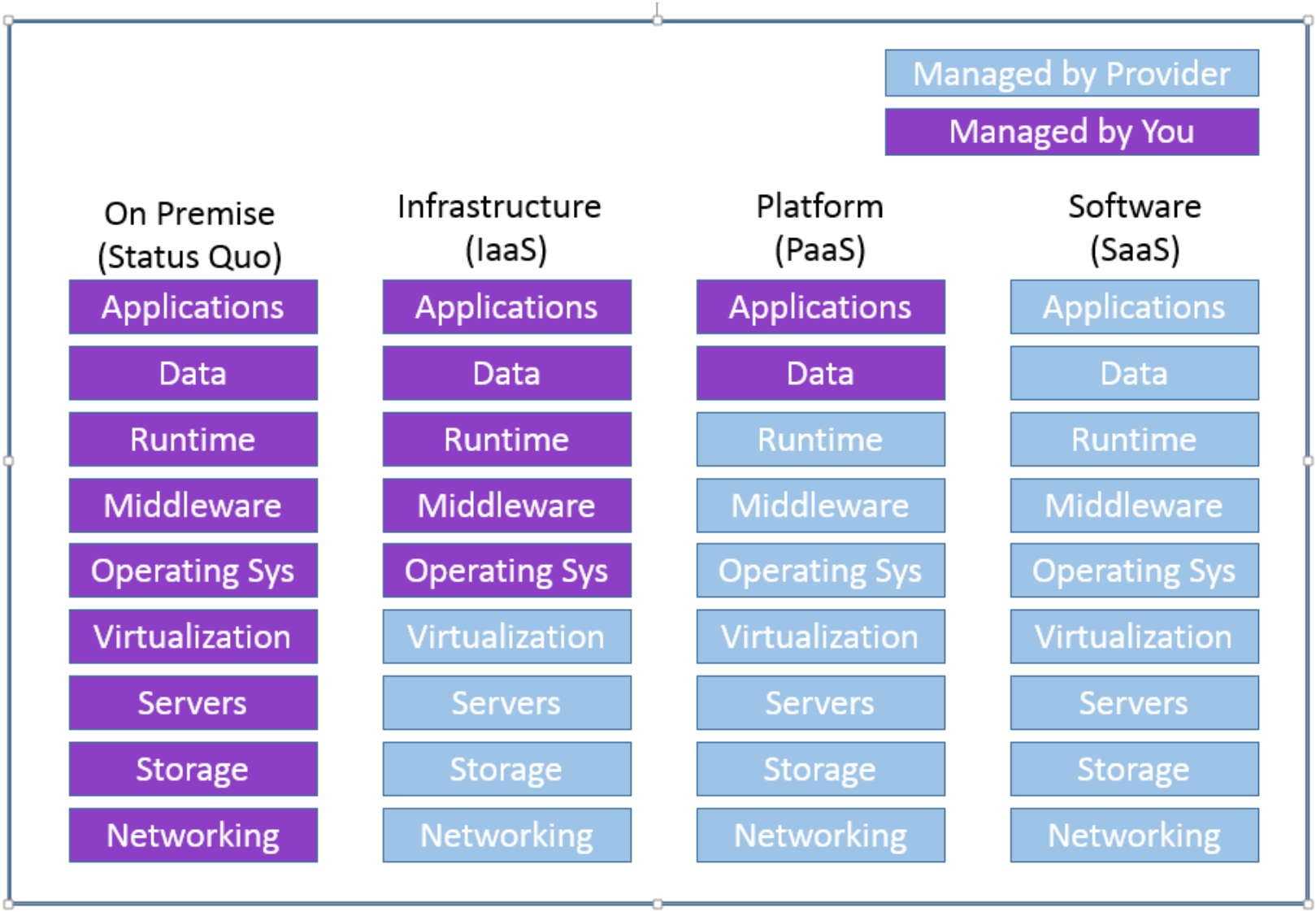
- Public Cloud
  - Available to any user of the internet willing to meet terms and conditions of provider
  - Key characteristic is multi-tenancy
- Private Cloud
  - Cloud infrastructure and technology maintained for a single organization, department, agency, etc.
  - Could be housed on premise or with a cloud computing provider
  - Could be run by internal resources or a provider
  - Avoid multi-tenancy
- Hybrid Cloud
  - Intermingling of private cloud, public cloud and on premise resources
  - Organizations take advantage of public cloud where it makes sense
  - Gartner predicts 50% of enterprise will have hybrid cloud solutions by 2017



Picking the Right 'As a Service'

- Infrastructure as a Service (Host)
  - Computer infrastructure is accessed via the cloud
  - Cloud providers manage the hardware and network
  - Cloud consumers manage every thing else (operating system, middleware, applications, etc.)
- Platform as a Service (Build)
  - Development environment accessed through cloud
  - Applications deployed in the cloud
  - Cloud providers manage all infrastructure, supporting software and runtime environment
  - Cloud consumers manage data and applications
- Software as a Service (Consume)
  - Software applications are accessed through the cloud and data is maintained in the cloud
  - Cloud providers provider all necessary hardware and software
  - Cloud consumer runs the app through a browser or front end app.

Picking the Right 'As a Service'



Infrastructure as a Service

- Consumers purchase computing power, storage space, networks and network services via a consumption model
- Providers are responsible for maintaining all hardware and providing virtualization
- Consumers are responsible for installing and managing the entire software stack along with any applications and data they host
- An organization embracing IaaS could reduce their hardware footprint but need to maintain similar IT skill sets

Infrastructure as a Service

- For application migration cloud consumers must….
  - Install Operating System
  - Install, instantiate, and configure database management systems
  - Install all necessary middleware and supporting software
  - Install and configure applications
- Cloud consumers are also responsible for….
  - Load balancing
  - Management of database management system(s)
  - Management of operating systems and all supporting software (upgrades, updates, etc.)

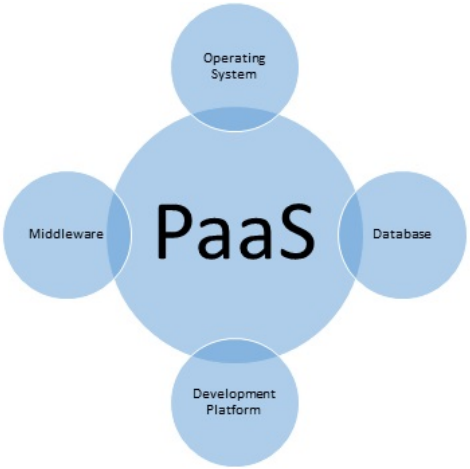
Platform as a service

- Applications are development and deployed in the cloud
- Feature rich environment for development, testing and deploying applications
- Generally provide multiple development and runtime environments
- Allows developers of products to eliminate the IT related and low level distractions and focus on business logic
- Developers create business logic than use PaaS services to deliver the business logic
- PaaS provides extreme agility through
  - Rapid deployments
  - More frequent deliveries of functionality
  - Continuous integration with automated testing

 | *Decades of Cost Management Excellence*

Platform as a Service

- For application migration the consumer must….
  - Provision and configure any databases
  - Implement the business logic of the application
  - Construct the rest of the application using PaaS services
  - Deploy the application
- PaaS consumer is also responsible for ….
  - Managing and maintaining the application
  - Managing the data



Software as a Service

- Software is accessed via a web browser or using a front end application (think Facebook or LinkedIn on your smart phone)
- SaaS provider is responsible for managing and maintaining hardware, networks, software stack, application and data
- For application (capability) migration the consumer must…
  - Migrate any databases to the SaaS platform

 | *Decades of Cost Management Excellence*

IaaS, PaaS, SaaS Case Study

- Case study intended to present three comparable solutions for migrating capability from on premise to the cloud
- Some simplifications and a bit of scenario stretching was involved
- The intent is to walk through the thought process an organization would go through when considering various alternatives in the cloud

The Case

- Ajax Company sells widgets…
  - 100 employees
  - 5000+ customers world wide
  - Currently use an on premise version of Seibel for CRM
  - They have a home grown application that interfaces with the Seibel database for handling custom reporting and analysis needs
  - They are considering a move to the cloud and think CRM would be a good place to start
  - The options they are going to consider are….
    - *Status Quo – Stick with Seibel on premise*
    - *SaaS – Migrate to SalesForce.Com and create an interface with their custom application using the SalesForce API*
    - *PaaS – Migrate to SalesForce.Com and use force.com to develop and integrate report and analysis capability with their SalesForce database*
    - *IaaS – Migrate the entire solution to Rackspace*

Case Study Particulars

- Ajax wants to look at a 5 year cost projection for each of the four scenarios
- This projection will include costs for
  - Recurring costs to use the solution (licensing fees or cloud service fees)
  - Costs of personnel devoted to IT Operations and Programming as related to support of the CRM process
  - Estimated costs of migration for each of the 'aaS' options
  - Estimated costs for support of Servers devoted to CRM operations
- For simplification, other costs are assumed to be the same in all four cases

Case Study Particulars

- Recurring costs – application licensing, cloud computing fees are assumed to be known
- Costs for migration activities and equipment maintenance will be estimated using a commercial estimation tool – TruePlanning® (though the methodology and thought process can be applied with any commercial or home grown tool)

Status Quo

- Current Situation
  - Three full time IT Technicians for the entire enterprise
    - *They've estimated that approximately 40% of IT technicians time is spent with activities related to CRM (maintenance of servers, updates, updated, internal help desk, etc)*
  - Two full time programmers
    - *They've estimated that approximately 50% of programmer time is spent maintaining and updated the custom application*
  - The IT organization maintains three servers and supports 125 end user devices. One server is devoted to CRM and the custom application
  - They have 100 Seibel licenses at a discounted rate of $1000 per user

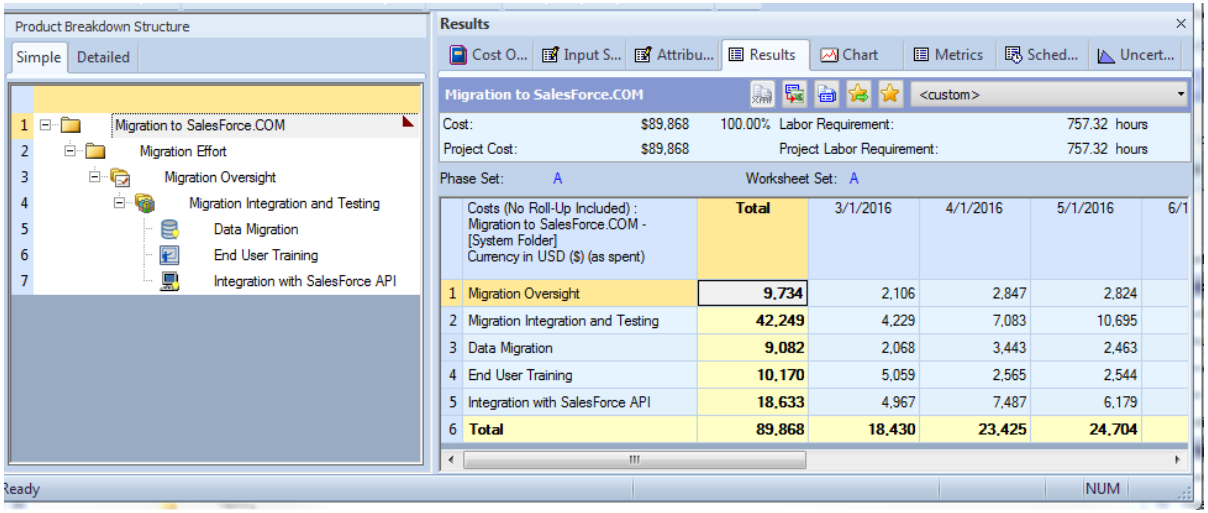
Status Quo

- Five year projected cost related specifically to CRM activities
  - Assume IT Tech salary at 50K annually with 130% burdening (40%*3*50000*2.3)
  - Assume Programmer salary at 80K annually with 130% burdening
  - Assume 2% inflation
  - 33% of cost model spread for server costs (to represent the one server devoted to CRM activities)

	Five Year Cost	2016	2017	2018	2019	2020
Licensing	$ 520,404	$ 100,000	$ 102,000	$ 104,040	$ 106,121	$ 108,243
IT Operations	$ 718,158	$ 138,000	$ 140,760	$ 143,575	$ 146,447	$ 149,376
Development	$ 957,543	$ 184,000	$ 187,680	$ 191,434	$ 195,262	$ 199,168
Server Maintenance	$ 96,884	$ 19,560	$ 19,224	$ 17,202	$ 24,455	$ 16,443
Total	$ 2,196,105	$ 422,000	$ 430,440	$ 439,049	$ 447,830	$ 456,786

SaaS – Migrate to Salesforce.com

- Cost associated with migration include….
  - Data migration of Seibel database to Salesforce
    - *Assume minimal modification and average 15 tables per database*
  - Integrating custom app with Salesforce API
    - *Development effort will be outsourced*
    - *Integration touches approximately 10% of the 500 Function Point application*
  - End user training
    - *Each end user will spend 1 to 2 hours self training*
  - License for salesforce Enterprise edition is $65/user/month



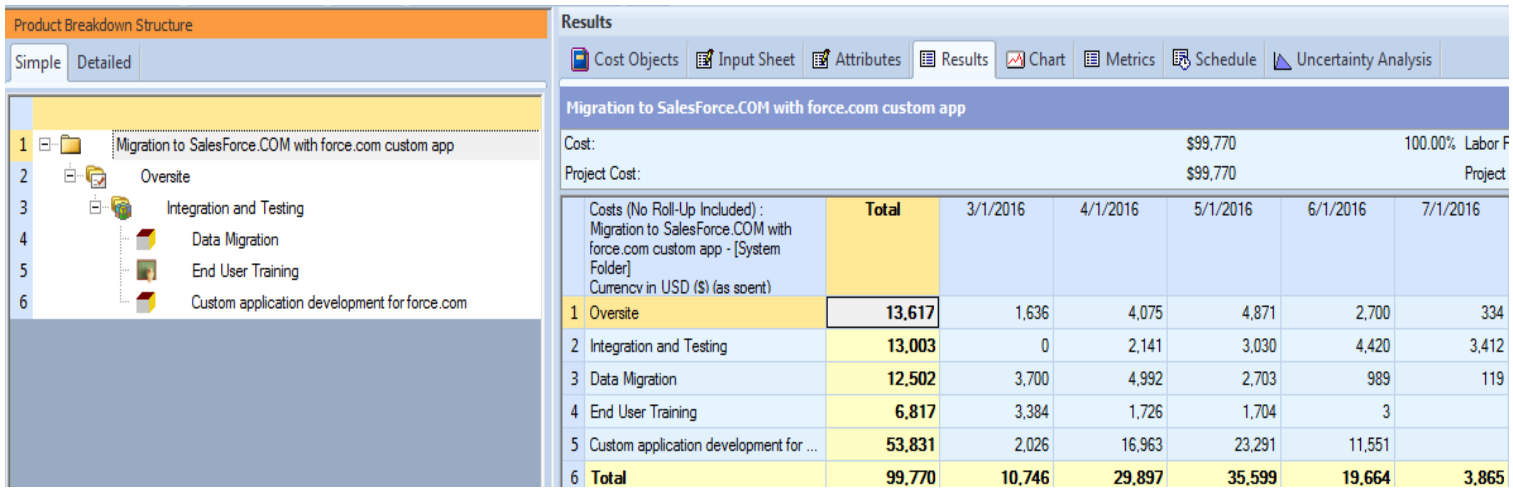
SaaS – Migrate to Salesforce.com

- Five year projections for SaaS (CRM only) include the following assumptions…
  - For transition period – Seibel is maintained the first year, Salesforce license kicks in mid year
  - After first year IT Technicians involvement drops to 20% (in house support, configuration issues, etc.)
    - *IT Costs = 0.2 * 3 * $50,000 * 2.3*
  - Development costs stay the same as the custom app continues to require maintenance and support
  - 50% of the capacity of the CRM server has been freed up for other functions
    - *Server Costs = 0.165 * Estimate for status quo*

Five Year Cost	Total	2016	2017	2018	2019	2020
Licensing	$ 460,485	$ 139,000	$ 78,000	$ 79,560	$ 81,151	$ 82,774
Migration Project	$ 89,868	$ 89,868	$ -	$ -	$ -	$ -
IT Operations	$ 428,079	$ 138,000	$ 70,380	$ 71,788	$ 73,223	$ 74,688
Development	$ 957,543	$ 184,000	$ 187,680	$ 191,434	$ 195,262	$ 199,168
Server Maintenance	$ 39,244	$ 8,068	$ 7,209	$ 7,096	$ 10,088	$ 6,783
Total	$ 1,935,976	$ 550,868	$ 336,060	$ 342,781	$ 349,637	$ 356,630

PaaS –Salesforce and Force.Com

- Costs associated with migration include
  - Data migration and end user training as with SaaS
  - Development of custom capability
    - *Services available through Force.Com indicated that only 100 Function Points of business logic needs to be created*
    - *This development will be outsourced*
  - Force.com Enterprise edition is $25/user/month
    - *Since only 40 of the users use this custom capability – only 40 licenses are required*



	Costs (No Roll-Up Included) : Migration to SalesForce.COM with force.com custom app - [System Folder] Currency in USD ($) (as spent)	Total	3/1/2016	4/1/2016	5/1/2016	6/1/2016	7/1/2016
1	Oversite	13,617	1,636	4,075	4,871	2,700	334
2	Integration and Testing	13,003	0	2,141	3,030	4,420	3,412
3	Data Migration	12,502	3,700	4,992	2,703	989	119
4	End User Training	6,817	3,384	1,726	1,704	3	
5	Custom application development for ...	53,831	2,026	16,963	23,291	11,551	
6	**Total**	**99,770**	**10,746**	**29,897**	**35,599**	**19,664**	**3,865**

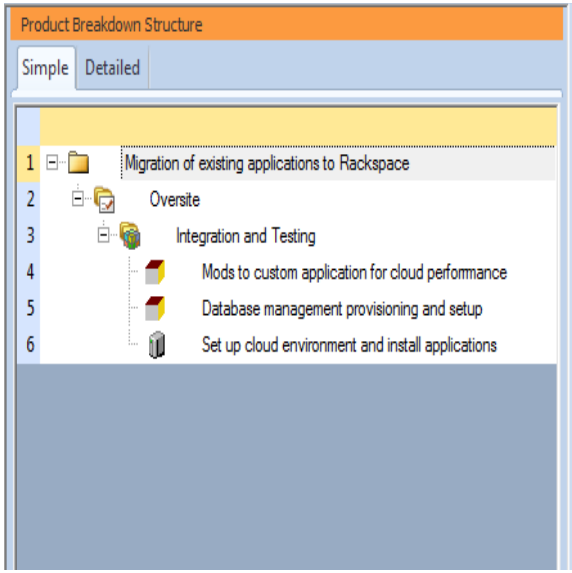
PaaS –Salesforce and Force.Com

- Five year projections for PaaS (CRM only) include the following assumptions…
  - *For transition period – Seibel is maintained the first year, Salesforce license kicks in mid year*
  - *After the transition - CRM requires no server capability so the server maintenance can be eliminated from the projection*
  - *One IT Technician position could have been eliminated but since the IT Technicians are more cloud savvy than programmers*
    - Technicians received training in force.com to maintain the custom solution
    - One Programming position was eliminated
  - *Assume that with the maintenance of the custom application on Force.com along with other CRM related support (in-house support, configuration, etc.) that 50% of IT Technicians time is devoted to CRM activities*
    - IT Costs = 0.5 * 3 * $50,000 * 2.3

	Five Year Cost	2016	2017	2018	2019	2020
Licensing	$ 515,945	$ 145,000	$ 90,000	$ 91,800	$ 93,636	$ 95,509
Migration Project	$ 146,939	$ 146,939	$ -	$ -	$ -	$ -
IT Operations	$ 897,697	$ 172,500	$ 175,950	$ 179,469	$ 183,058	$ 186,720
Total	$ 1,560,581	$ 464,439	$ 265,950	$ 271,269	$ 276,694	$ 282,228

IaaS – Migrate to Rackspace

- Costs associated with migration include
  - Custom application requires 10% rework to take advantage of cloud features such as virtualization and scalability
  - Technicians need to install provision and configure the DBMS
  - Technicians need to recreate the software stack in the cloud
  - Technicians need to port the applications and the data to the cloud environment



Results

Cost Objects | Input Sheet | Attributes | Results | Chart | Metrics | Schedule | Uncertainty Analysis

Migration of existing applications to Rackspace

Cost: $63,019 100.00% Labor

Project Cost: $63,019 Project

	Costs (No Roll-Up Included) : Migration of existing applications to Rackspace - [System Folder] Currency in USD ($) (as spent)	Total	3/1/2016	4/1/2016	5/1/2016	6/1/2016	7/1/2016
1	Oversite	8,866	2,694	2,030	2,065	1,265	477
2	Integration and Testing	16,597	0	817	2,726	4,357	5,118
3	Mods to custom application for cloud...	24,591	1,031	8,635	10,346	4,579	
4	Database management provisioning ...	5,733	2,679	2,579	447	24	3
5	Set up cloud environment and install...	7,232	7,232	0			
6	**Total**	63,019	13,638	14,062	15,584	10,226	5,599

IaaS – Migrate to Rackspace

- Five year projections for IaaS (CRM only) include the following assumptions…
  - Seibel License carried over for the first year
  - Reduction of one server
  - IT Technicians' involvement in CRM assumed to be 25% - as they are no longer involved in the hardware maintenance, but still need to update and upgrade software
  - Still need one Programmer FTE to maintain custom application
  - Using RackSpace calculator it was determined that the required computing power, storage space and bandwidth would cost $8396 per month

	Five Year Cost	2016	2017	2018	2019	2020
Licensing	$ 573,941	$ 150,376	$ 102,767	$ 104,822	$ 106,919	$ 109,057
Migration Project	$ 89,897	$ 89,897	$ -	$ -	$ -	$ -
IT Operation	$ 448,848	$ 86,250	$ 87,975	$ 89,735	$ 91,529	$ 93,360
Development	$ 957,543	$ 184,000	$ 187,680	$ 191,434	$ 195,262	$ 199,168
Total	$ 2,070,230	$ 510,523	$ 378,422	$ 385,990	$ 393,710	$ 401,584

What's the right 'As a Service'?

	Five Year Cost	2016	2017	2018	2019	2020
Status Quo	$ 2,196,105	$ 422,000	$ 430,440	$ 439,049	$ 447,830	$ 456,786
Salesforce.Com (SaaS)	$ 1,935,976	$ 550,868	$ 336,060	$ 342,781	$ 349,637	$ 356,630
Force.com (PaaS)	$ 1,560,581	$ 464,439	$ 265,950	$ 271,269	$ 276,694	$ 282,228
Rackspace (IaaS)	$ 2,070,230	$ 510,523	$ 378,422	$ 385,990	$ 393,710	$ 401,584

Discussion and Final Words

- Three flavors of cloud solutions available
  - IaaS – provider provides infrastructure, consumer manages software data and applications
  - PaaS – provide provides infrastructure, development platform, services, consumer manages applications and data
  - SaaS – provider provides infrastructure, platform, application, provider manages application and data
- Concerns when planning a cloud migration
  - Do we have the right skill sets to consider IaaS, PaaS, SaaS
  - Are we willing to spend money to develop cloud skills
  - What data are we comfortable housing in the cloud
  - Is Public, Private or Hybrid solution suitable for our applciations
  - What integration issues would we expect
  - Do we plan to use cloud migration to modernize existing legacy applications

Contact Information

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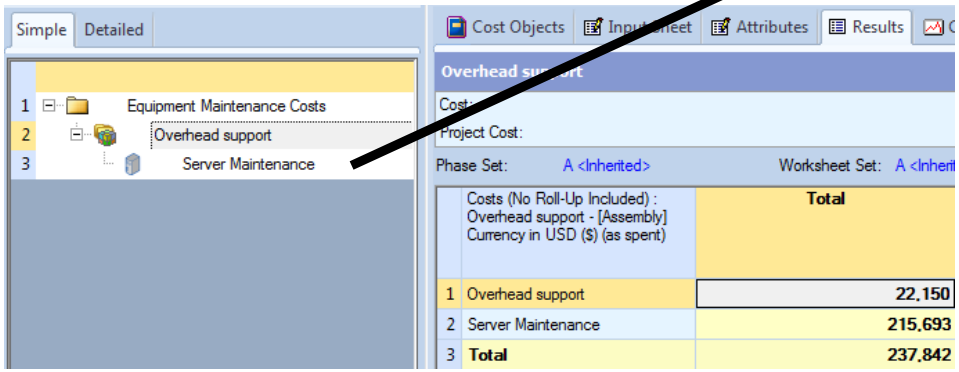
Backup Slides

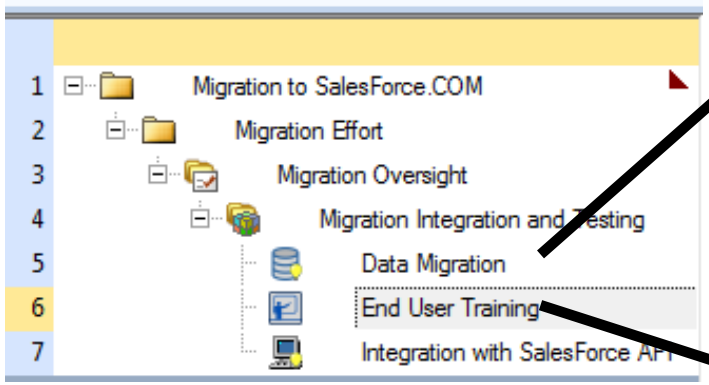
Status Quo

- Estimated Cost for Server maintenance



		Value
1	Start Date	1/1/2016
2	**Device Information**	
3	Type of Device	Server
4	Number of Deployments	**Custom - Yearly**
5	Purchasing Model	Purchase
6	Quantity Per Next Higher Level	1.00
7	Service Options	In-House
8	**Project Details**	
9	Operating Specification	1.00
10	Organizational Productivity	1.000
11	**Server Inputs**	
12	Server Type	**Blade**
13	Server Complexity Factor	1.00
14	**Purchase Inputs**	
15	Unit Purchase Price	**4,044.52**
16	Unit Lifetime	**3.00**
17	**Supporting Details**	
18	Setup and Installation Time	**20.00**
19	Number of Operational Hours	0.00

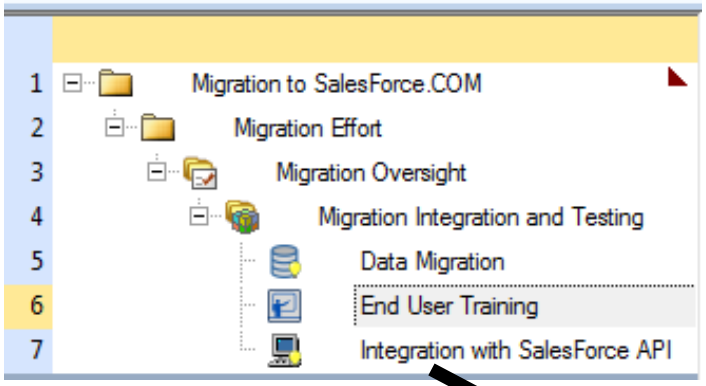
SaaS – Migrate to Salesforce.com



		Value
1	Start Date	
2	Number of Users	**100.00**
3	**Application Details**	
4	Operating Specification	1.00
5	Organizational Productivity	1.000
6	External Integration Complexity	3.00
7	**Project Details**	
8	Team Experience	**2.67**
9	**Database Details**	
10	Type of Database Project	**Migration**
11	Number of New Databases	1.00
12	Number of Existing Databases	**1.00**
13	Number of Tables Per Database	**15.00**

		Value
1	Start Date	
2	**Course Details**	
3	Type of Training	**Standard E-Learning**
4	Course Level	Introduction
5	Interactivity	**Level 1: Passive**
6	Instruction Duration	**1.50**
7	Number of Course Deliveries	**100.00**
8	Average Class Size	**1.00**
9	Source of Training	In-House
10	**Project Details**	
11	Organizational Productivity	1.000

SaaS – Migrate to Salesforce.com



Phase Set: A <Inherited> Worksheet Set: A <Inherited>

	Costs (No Roll-Up Included) : Migration Effort - [Folder] Currency in USD ($) (as spent)	Total	2016
1	Migration Oversight	**9,734**	9,734
2	Migration Integration and Testing	**42,249**	42,249
3	Data Migration	**9,082**	9,082
4	End User Training	**10,170**	10,170
5	Integration with SalesForce API	**18,633**	18,633
6	**Total**	**89,868**	**89,868**

		Value
1	Start Date	
2	**Application Details**	
3	Development Application Type	None
4	Functional Complexity	4.50
5	Operating Specification	**1.00**
6	Organizational Productivity	1.000
7	Development Team Complexity	**2.00**
8	**Contract Service Options**	
9	Development Service Options	In-House
10	**Software Size**	
11	Size Units	**IFPUG Function ...**
12	New Size	**0**
13	Adapted Size	**50**
14	Percent of Design Adapted	**20.00%**
15	Percent of Code Adapted	**20.00%**
16	Percent of Test Adapted	**20.00%**
17	Design Repeat	**65.00%**
18	Reused Size	**450**

PaaS –Salesforce and Force.Com

Product Breakdown Structure

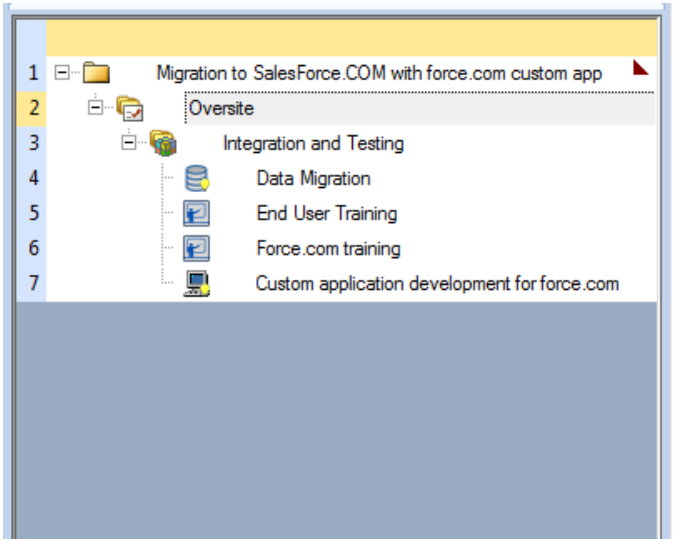
Simple | Detailed

1	Migration to SalesForce.COM with force.com custom app
2	Oversite
3	Integration and Testing
4	Data Migration
5	End User Training
6	Force.com training
7	Custom application development for force.com

		Value
1	Start Date	
2	**Course Details**	
3	Type of Training	Synchronous E-Lear...
4	Course Level	**Advanced**
5	Interactivity	**Level 3: Complex...**
6	Instruction Duration	**40.00**
7	Number of Course Deliveries	**3.00**
8	Average Class Size	**1.00**
9	Source of Training	In-House
10	**Project Details**	
11	Organizational Productivity	1.000
12	**In-House Training**	
13	Subject Matter Expert Availability Factor	1.00
14	Reuse Factor	1.00
15	Development Team Expertise	3.00
16	**Other Costs**	
17	Travel and Living Costs Per Class	0.00
18	Delivery Material Costs	**3,000.00**

		Value
1	Start Date	
2	**Application Details**	
3	Development Application Type	**Business Analysi...**
4	Functional Complexity	4.50
5	Operating Specification	**1.00**
6	Organizational Productivity	1.000
7	Development Team Complexity	**2.00**
8	**Contract Service Options**	
9	Development Service Options	In-House
10	**Software Size**	
11	Size Units	**IFPUG Function ...**
12	New Size	**100**
13	Adapted Size	0
14	Percent of Design Adapted	0.00%
15	Percent of Code Adapted	0.00%
16	Percent of Test Adapted	0.00%
17	Design Repeat	**50.00%**
18	Reused Size	**400**
19	Reuse Factor	**0.20**
20	Deleted Size	0

PaaS –Salesforce and Force.Com



Oversite

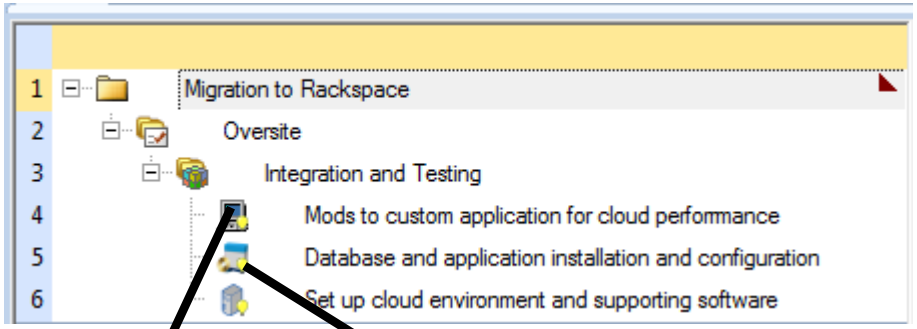
Cost:

Project Cost:

Phase Set: A <Inherited> Worksheet Set: A <Inherited>

	Costs (No Roll-Up Included) : Oversite - [System] Currency in USD ($) (as spent)	Total	2016
1	Oversite	**17,149**	17,149
2	Integration and Testing	**11,937**	11,937
3	Data Migration	**9,082**	9,082
4	End User Training	**10,170**	10,170
5	Force.com training	**44,770**	44,770
6	Custom application development for force...	**53,831**	53,831
7	**Total**	**146,939**	**146,939**

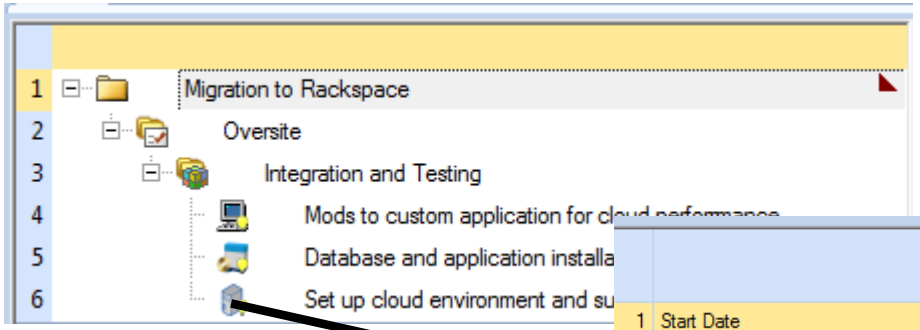
IaaS – Migrate to Rackspace



		Value
1	Start Date	
2	**Application Details**	
3	Development Application Type	**Business Analysis System**
4	Functional Complexity	4.50
5	Operating Specification	**1.00**
6	Organizational Productivity	1.000
7	Development Team Complexity	**2.00**
8	**Software Size**	
9	Size Units	**IFPUG Function Points**
10	New Size	**0**
11	Design Repeat	**65.00%**
12	Language	**Visual Basic.NET**
13	External Integration Complexity	3.00

		Value
1	Start Date	
2	Number of Users	**100.00**
3	**Application Details**	
4	Functional Complexity	**3.70**
5	Operating Specification	1.00
6	Organizational Productivity	1.000
7	Functional Size	**250.00**
8	External Integration Complexity	3.00
9	**Project Details**	
10	Project Type	**Migration**
11	Team Experience	3.00
12	Number of Unique Applications	1.00
13	**Database Details**	
14	Type of Database Project	**Migration**
15	Number of New Databases	**0.00**
16	Number of Existing Databases	**3.00**
17	Number of Tables Per Database	**15.00**

IaaS – Migrate to Rackspace



	Costs (No Roll-Up Included) : Oversite - [System] Currency in USD ($) (as spent)	Total	2016
1	Oversite	**13,847**	13,847
2	Integration and Testing	**10,895**	10,895
3	Mods to custom application for cloud perf...	**49,984**	49,984
4	Database and application installation and...	**7,939**	7,939
5	Set up cloud environment and supporting...	**7,232**	7,232
6	**Total**	**89,897**	**89,897**

		Value
1	Start Date	
2	**Device Information**	
3	Type of Device	Server
4	Number of Devices	**1.00**
5	Purchasing Model	**Infrastructure as a Service**
6	Infrastructure as a Service Mo...	0.00
7	Service Options	In-House
8	**Project Details**	
9	Operating Specification	1.00
10	Organizational Productivity	1.000
11	**Server Inputs**	
12	Server Type	
13	Server Complexity Factor	1.00
14	**Supporting Details**	
15	Setup and Installation Time	**80.00**
16	Number of Operational Hours	0.00