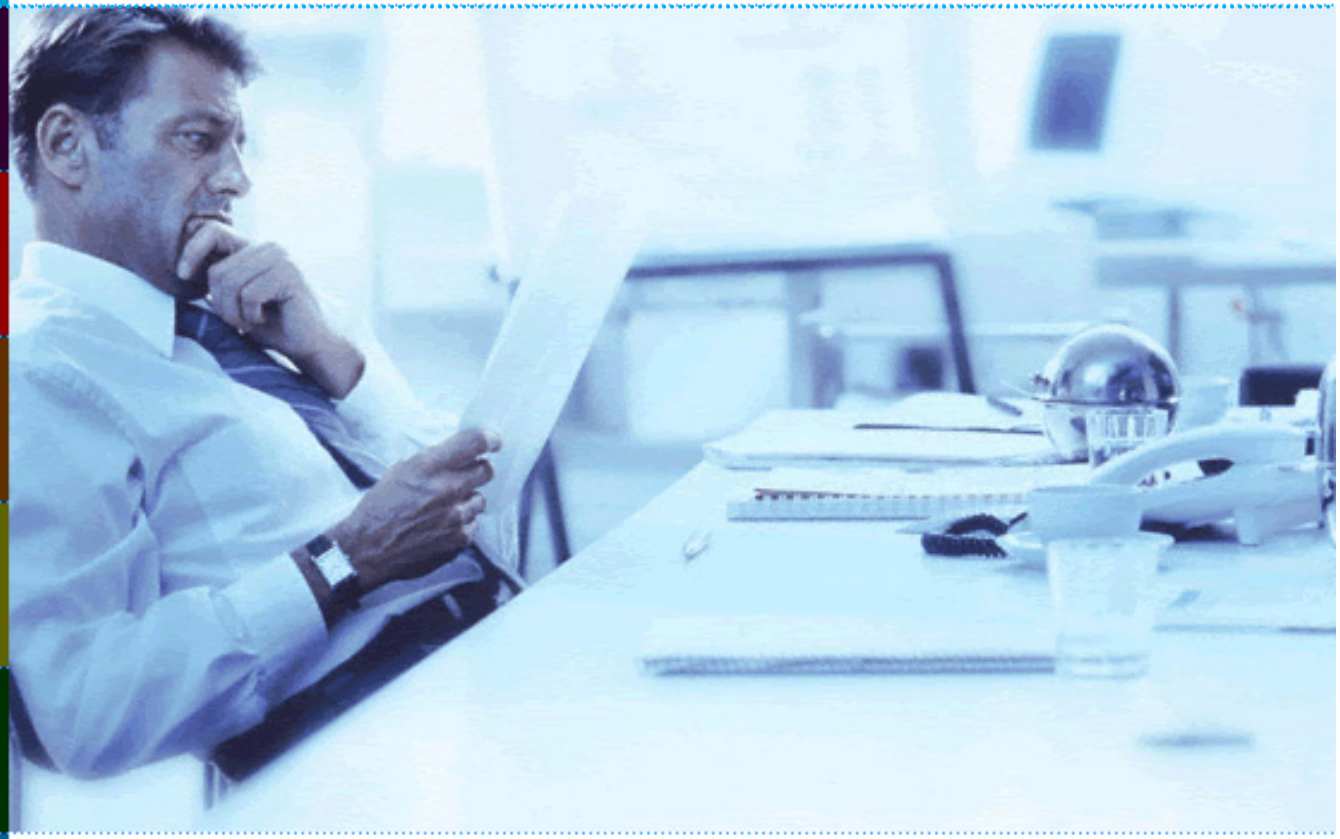
Know the return on IT.



SAP Journey to Virtualization and Cloud

by Ganesh Radhakrishnan, CEO WFT

AGENDA

- About Presenter (Ganesh Radhakrishnan)
- CIO's Pain Point
- SAP Virtualization / Cloud Decision
- Is SAP Virtualization or Cloud Realistic?
- What is the criteria for making the right decision ?
- What is the appropriate technology?
- What is the right level of virtualization or cloud?
- What challenges exist and how do we overcome them?
- Wrap-Up
- Resources
- Q&A

Ganesh Radhakrishnan, CEO WFT

- Working in IT for 21+ years (18+ years with SAP)
- Ran HP/SAP Competency Center in Geneva & Walldorf
- Developed & Integrated HP Clusters with SAP
- Architected & Implemented 65 of the Fortune 100 Disaster Recovery Infrastructure for SAP
- Methodology to reduce RTO with Push Button DR Automation for SAP
- Founder Wharfedale Technologies (WFT)
- Founder Coodam.com (Education Portal) & WFTCloud.com (SAP Portal)
- 2 U.S. Patent (Buffered Mouse)
- Written Whitepapers and Books including Disaster Recovery for SAP Best Practices
- Currently finished writing a book on “SAP Virtualization and Future Cloud”

WFT Introduction

- Founded in 2000
  - Senior Managers & Partners from Deloitte, IBM GS and EMC
- HQ in Princeton (South of New Jersey)
- Who is WFT?
  - WFT creates and delivers proven solutions for companies running SAP
- How do we do it?
  - Provide SAP application & infrastructure / virtualization / cloud integration
- What do we do today?
  - SAP Application Services
  - SAP Infrastructure / Virtualization Services
  - SAP Cloud Roadmap & Strategy Services
  - SAP Managed Services Performance Audit

Our innovative infrastructure solutions for SAP allows our clients to minimize downtime and achieve optimal performance by maximizing SAP capital investments.

CIO Long Term Vision for SAP Virtualization & Cloud

1. Reduce Costs

- Minimize HW/SW acquisition/maintenance costs.
- Standardize on a common architecture for SAP and other business systems.
- Standardize on strategic vendors.

2. Increase Business Value

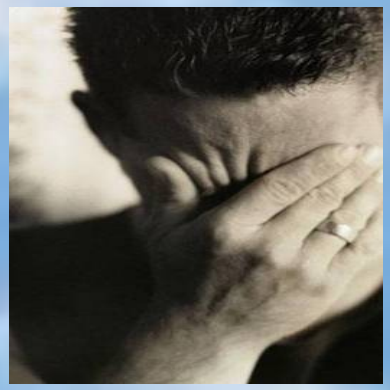
- Improve executive analysis and reporting capabilities.
- Increase adoption of SAP BW amongst user base
- Reduce time to resolution of exception processes.

3. Reduce Risk

- Architect solution for long-term growth and stability.
- Leverage marquee vendors with a proven affinity with SAP.
- Ensure technical & functional skill sets are available.

Business Drivers

- 5% reduction in expenses can result in up to 45% increase in net income (SAPInsider/ASUG/SAP)
- IT Budgets = 66% for running the business, 19% for growing the business and 15% for transforming the business (Gartner)
- Overall IT mission to do more with less.



CIO Headache
I am supposed to do the same job, but with less budget and headcount?

Cloud Computing Statistics

- 44% of enterprises considering private clouds (IDC)
- Cloud computing services will reach that $225.5 billion market by 2015 (Global Industry Analysts)
- 82% of solution providers expect revenue increase with cloud/SaaS offerings (CRN State of the Market)
- 20% of all businesses will own absolutely no IT assets come 2012 (Gartner)

How Do You Define the Cloud ?

How Do You Define the Cloud ?

- Cloud computing is internet-based computing, whereby shared resources, software and information are provided to computers and other devices on-demand, like electricity.
  http://en.wikipedia.org/wiki/Cloud_computing

- On-demand self-service internet infrastructure where you pay-as-you-go and use only what you need, all managed by a browser, application or API. Cloud computing is broken up into multiple segments including: Cloud Infrastructure, Cloud Platforms and Cloud Applications.
  http://www.servepath.com/support/definitions.php

SAP Virtualization or Cloud Decision

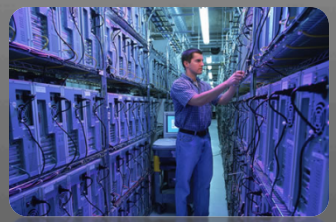
- Is SAP Virtualization or Cloud Real?
- What is the criteria for making the right decision ?
- What is the appropriate technology?
- What is the right level of virtualization or cloud?
- What challenges exist and how do we overcome them?

SAP Virtualization or Cloud Decision

1

- Traditional capacity planning requires significant…
  - Architectural planning…
  - Hardware provisioning…
  - Administrative logistics…
  - Application migration…
  - Operational procedures…

2



- Virtualization/Cloud changes everything…
  - Compute, storage, and networking resources can be provisioned on-demand
  - A layer of abstraction insulates technical professionals from SAP & underlying complexity
  - Capacity is dynamic, atomic, and limitless

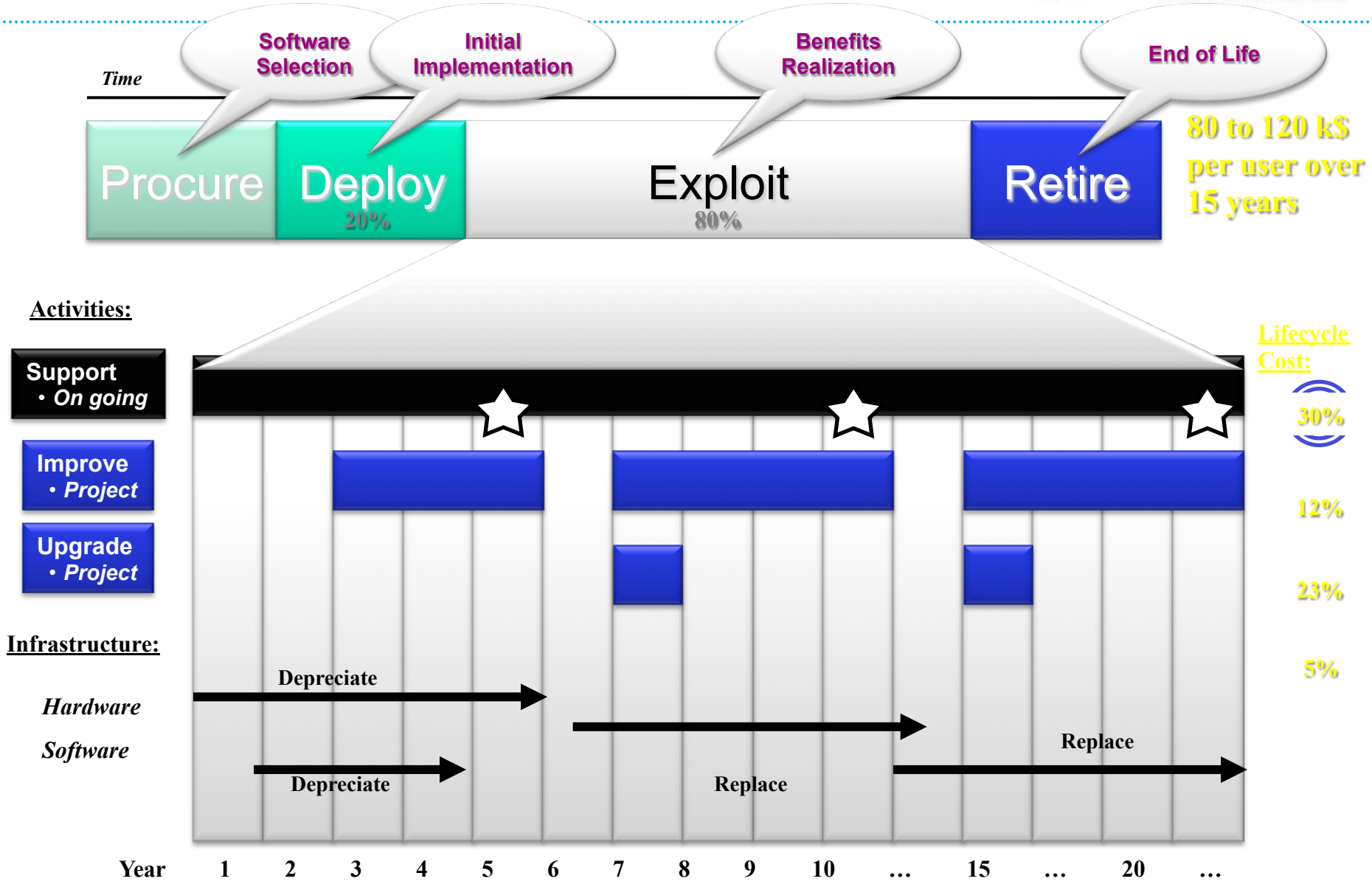
3

- Resources are free to innovate, create, and automate
  - SAP application performance can be optimized
  - Capital assets can be minimized
  - Human capital can be deployed for higher-value work

Business Impact

- 15%-25% reduction in SAP HW Server infrastructure across all landscapes: sandbox, test, development and production
- 20%-25% reduction in IT SAP Basis Technical Center of Excellence (TCOE) personnel and tasks
- 10%-15% reduction in IT Functional Center of Excellence (FCOE) personnel and application development activities

SAP Life Cycle



Balanced Architecture Definition for SAP

An architecture where the right resources are allocated for the right workload[*] at the right time.

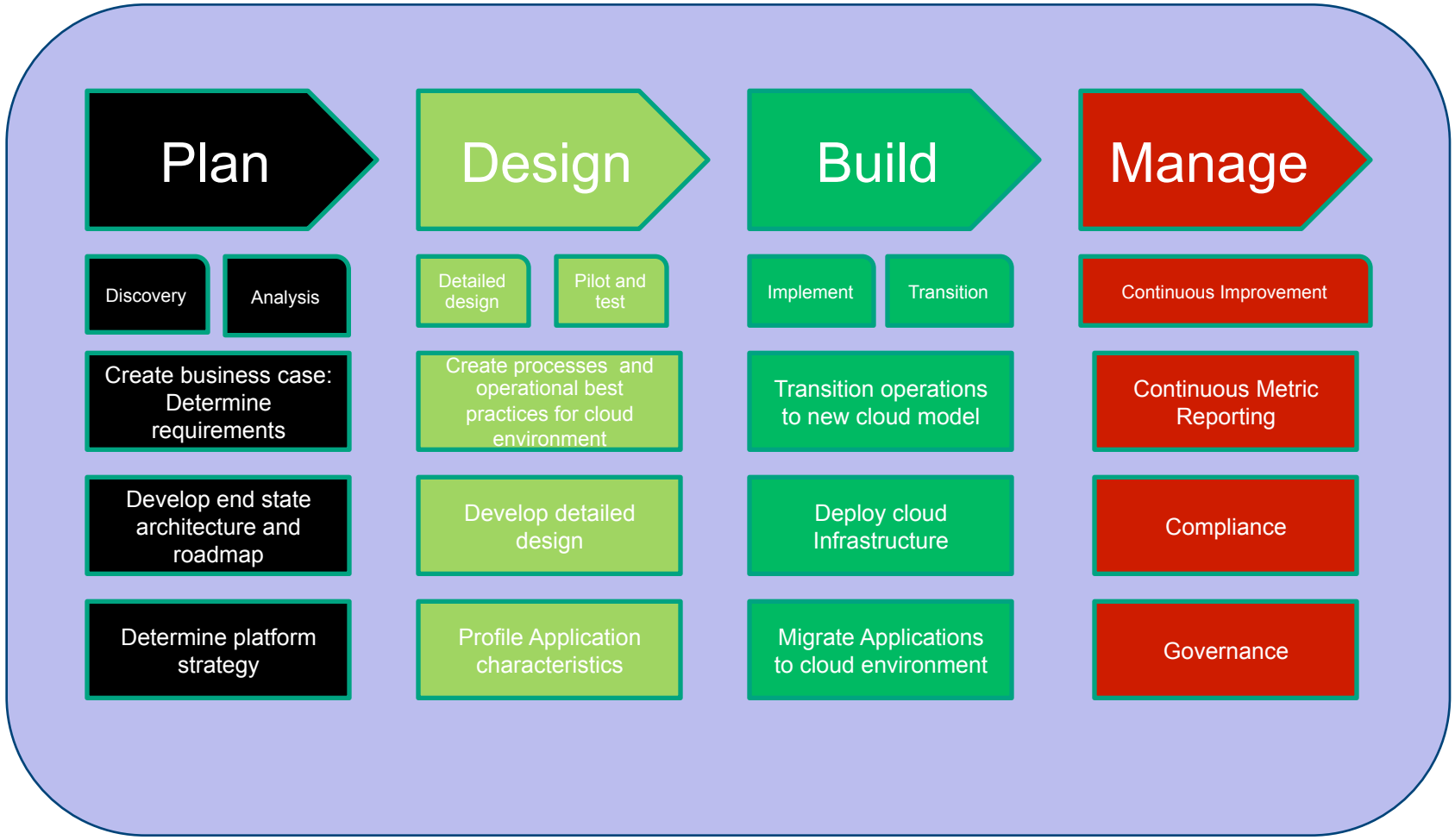
- Ganesh

[*] One size does not fit all

SAP Customers as of today

1. Customers desiring SAP Virtualization or Cloud
   - Where do I begin?
2. Customers who have partial SAP Virtualization to Cloud
   - Virtualized Application Servers
   - HA configurations
   - Domains & Partitions
   - Where do I go next?
3. Customers who have completed SAP Virtualization - Next Step as Cloud
   - Virtualized Databases
   - Virtualized Compute Resources
   - What can I do better?

SAP Roadmap to Virtualization or Cloud



Customers desiring SAP Virtualization or Cloud

- Perform a SAP CapEx & OpEx reduction assessment
- Perform a SAP Virtualization or Cloud Assessment
  - Is VIRTUALIZATION or Cloud Realistic for **your** SAP Landscape ???
    - Complete vs. Partial
    - Private vs Public vs Hybrid
  - Operating System Choice: Windows or Linux (if Cloud)
  - Database Choice: Oracle, MS SQL Server, DB2, MaxDB
  - Landscape Inventory: Servers, OS, DB, Storage, Network & Applications (includes Bolt-On & External applications)
  - Utilize assessments (and SAPS requirement) to create a Bill of Materials for Infrastructure changes
  - Consider factors of additional load: new SAP component, Upgrade or UNICODE conversion

Customers desiring SAP Virtualization or Cloud

- Common Mistakes
  - 1 to 1 conversion sizing
  - Excessive or inadequate storage space allocation
  - Supportability of the SAP Landscape in the proposed environment
  - Non-Production requirements
  - Hardware compatibility requirements
  - Management Tools
  - Downtime Calculations during Transition (if different Datacenter)

Sizing Calculations	
Small	200 Concurrent Users 2,000 SAPS
Medium	1,000 Concurrent Users 10,000 SAPS
Large	5,000 Concurrent Users 45,000 SAPS
Very Large	10,000 Concurrent Users 90,000 SAPS

Customers desiring SAP Virtualization or Cloud

- Design Considerations
  - Server Consolidation
  - Sizing of Virtual or Cloud Environment (vCPU, Memory, Network…)
  - Business Continuance
    - Single Points of Failure
    - High Availability for SAP
    - Dynamic Resources Scheduling
  - Datacenter Failure (Facilities)
  - Booting OS from SAN/NAS Storage
  - Storage Failure
  - SAP Adaptive Computing
  - Backup & Local Recovery in a Virtual Environment
  - SAP System Refresh
  - Disaster Recovery

Customers desiring SAP Virtualization or Cloud

- Server Consolidation
  - Few enterprise servers vs. Many commodity servers
  - Scalability: Enterprise vs. Commodity
    - Physical consolidation
    - Logical consolidation
    - Re-Hosting (Changing Platform) or Cloud Provider
    - Work-load consolidation
- Sizing consideration for a Virtual or Cloud Environment
  - Allocation of vCPU's based on workload
  - Decision related to Memory commitment for SAP Systems
  - Deploying Virtual machine files on Shared Storage (Very Important)
  - Path redundancy and SAN Fail-Over capability
  - Recommended to have 2 Separate Network at the least (Private / Public)
    - Private (SAP Traffic between VM's)
    - Public (VM's and End-Users)

Customers desiring SAP Virtualization or Cloud

- Storage considerations (Big Challenge with Cloud)
  - Combination of VMFS & RDM is recommended for SAP Landscape.
    - VMFS is primarily used for Guest OS and
    - NON-Production SAP Systems normally resides on VMFS for easier administration and management.
    - RDM (Raw Device Mapping) is used for Production SAP Database files.
    - Cluster Data & Quorum disks need to be configured with RDM.
    - RDM can be used in environment where disk based backup cloning solution are required.
    - RDM is required when migrating from Physical Servers to Virtual.
  - Recommend spreading Database Files into multiple Luns or Volumes for better I/O Performance.
  - SAN Design plays a vital role to ensure seamless Failover.
  - Booting OS from SAN Storage simplify Disaster Recovery.

Customers desiring SAP Virtualization or Cloud

- High Availability considerations
  - Ability to recover from Hardware Failure.
  - Ability to recover from Application level Failure.
  - Network redundancy in Server Service Control is recommended.
  - Third Party Cluster is required to handle SAP Application Monitoring and Failover.
    - Load Balanced Cluster design for Failover.

- SAP Adaptive Computing consideration
  - SAP Adaptive install is recommended for Virtualization.
  - SAP ACC agent need to be installed for V2P requirement (Virtual to Physical)

Customers desiring SAP Virtualization or Cloud

- Backup & Recovery
  - Guest OS based Backup
  - Storage Based Mirroring or Snap-shot based
  - Local Service Level Agreement (SLA) to meet.
  - Consolidated Backup on Proxy Server
  - Application Integrated Backup & Restore capability
  - Backup to disk with De-duplication
- Disaster Recovery
  - Repurposable SAP Data Centers are highly recommended
    - PROD, TRN & SBX on Primary / QA & DEV on Secondary Site
    - Testing without effecting Production
  - RTO can be minimized using automated recovery tools (SRM)
  - Designing Restartable or Recoverable copies.
  - Federated Point in Time Consistency required for SAP DR.
  - Most importantly not only to Fail-Over but need to Fail-Back.

Customers desiring SAP Virtualization or Cloud

- Private, Public or Hybrid cloud architecture
  - Customers with completely virtualized SAP landscapes should include a cloud service model in their roadmap for the ability to seamlessly scale their services in response to increasing demands.
  - Move your NON-Production to Public Cloud (Virtual Private Cloud) by extending your network to bring cost down drastically.
  - Allocating resources for on-demand System Copies, separate debug environments, and individual QA systems for separate projects with minimal operational increase enables lowering IT barriers to innovation.

- Chargeback or Report Back
  - Once end-users are enabled (Private cloud), they need to be policed or resources will be over-allocated, under-utilized and the tragedy of the commons occurs, thereby negating the advantage of the infrastructure elasticity feature of the cloud.

Customers desiring SAP Virtualization or Cloud

- Address Disaster Recovery Plans
  - Disaster Recovery Plans for a completely virtualized landscape can be augmented by automating application recovery steps and developing processes and procedures for a successful failback to primary site.
  - **Disaster Recovery Fail-Over to Public (VPC Providers) reducing cost of maintaining DR facility.**

- Complete landscape virtualization
  - SAP applications that are not based on SAP NetWeaver Application Server ABAP or Java are not currently supported for virtualization. The landscape can be considered completely virtualized only when all these components are supported for virtualization by SAP.

Cloud Model – Benefits and Risks

- Benefits
  - Speedy deployment (the app, hardware, network should already exist)
  - Vendor maintained expertise
  - Leveraging the latest in technology
  - Lower overall Total Cost of Ownership (or just Total Cost)
  - On-Demand resources and licensing

- Risks
  - Multi-tenancy concerns – performance, availability
  - Security – access, compliance, data
  - Most apps today allow for limited customization
  - Interfaces and/or interface development may be limited
  - Less control over environment
  - Time to enhancement modifications and patches

What Does the Cloud Mean to SAP Customers?

- What it is …
  - Opportunity to leverage best TCO solutions for your organization
  - Business Opportunities:
    - Prototype new application with little or no up front investment
    - Dynamically grow resources as needed – On-Demand
    - Licensing as you need
  - The cloud has bridged the gap to allow access to applications anywhere
  - Another tool in the IT belt to be used where appropriate

- What it is not …
  - An end to current mainstream SAP architecture
  - Complete replacement of your current landscape
  - It is not a perfect fit for all situations or all customers
  - A computing environment without issues

Questions to Ask Before Leveraging a Cloud Solution

1. **What is your definition of Cloud computing?**
   - Make sure you and your team are speaking the same language first
   - Be very clear with vendors on your definition

Questions to Ask Before Leveraging a Cloud Solution

2. What are your business objectives?

- Determine your business objectives, then the goals and strategy that fit them
  - Core applications
  - Infrastructure
  - 3rd party applications
  - Business drivers
    - Costs
    - Expertise
    - Location

3. What are your business objectives?

- Security
- GRC Concerns (ITAR, PCI)
- Multi-tenancy concerns
  - Data security
  - SLA's

Questions to Ask Before Leveraging a Cloud Solution

WHARFEDALE TECHNOLOGIES

4. **How important is custom development/customization to your organization**
   - Does a cloud solution provide the required flexibility?

5. **What interfaces must be accounted for?**
   - What requirements do you have?
   - How often do they change?

6. **How do you calculate ROI?**
   - Infrastructure
   - License fees
   - Support/Maintenance fees
   - Training
   - Labor costs
   - Upgrades costs
   - Capital expense vs Lease or rent
   - Over how many years?

Wrap Up

"An architecture where the right resources are allocated for the right workload[*] at the right time." - Ganesh

- **The Balanced Approach**
  - One size should not fit all.
  - Use resources effectively and appropriately.
  - If all resources are virtualized or on cloud, flexibility is guaranteed.
  - Efficiency and Effectiveness are our goal.
  - Holistic approach to Virtualization or Cloud design.

- **Challenge Everything**
  - Ask "Why are we doing it this way ?"
  - Ask "Can we leverage this for tomorrow ?"
  - Ask "Are we optimally utilizing all resources ?"
  - Ask "Does this address business requirements ?"

Definitions

- Multi-tenancy
  Multiple customers sharing the resources, database and application (like tenants in an apartment)

- Lock-in
  Refers to being “locked-in” to a cloud vendor’s architecture, configuration and requirements.
  Could lead towards monopolies by certain key vendors.

- Private Cloud
  An environment using the technologies of cloud computing, but managed internally

- On-Premise
  Being physically located at the customer site

Definitions

- SaaS*

  Software as a Service – Applications on the Net that are generally sold per user by month

- IaaS*

  Infrastructure as a Service – Outsourced infrastructure in terms of servers, storage and networking.

- LaaS

  Landscape as a Service – Generic SAP specific landscapes that are hosted on a project or full time basis

- PaaS

  Platform as a Service – An IaaS configured for a specific purpose or development platform

SAP Certification for Cloud Services

CERTIFICATE

SAP-Certified Provider of Cloud Services

SAP AG HEREBY CONFIRMS THAT THE PARTNER

Wharfedale Technologies Inc.

Certification Audit
SAP-certified provider
of cloud services

for

USA

HAS SUCCESSFULLY PASSED THE TECHNICAL CERTIFICATION AUDIT:

SAP-Certified in Cloud Services

The provider offers consulting services to design and build cloud solutions for SAP applications.

The audit has been performed on13th August 2010 in
2850 Brunswick Pike
Lawrenceville, NJ 08648, USA.

The certification will be valid until September 2012.

Walldorf, 13th October 2010
Michael Ressemann
VP Outsourcing Services
SAP AG, Outsourcing & On Demand GTM

Walldorf, 13th October 2010
Carsten Luntz
Auditor
SAP AG, Outsourcing & On Demand GTM

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