

Readiness Assessment

Cloud Readiness Assessment Final Report

Prepared for
ABC, Inc.
March 2011

Sample Report

Any similarity with any existing
company or organization is
purely coincidental.

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Preface

Purposeful Clouds completed a seven-day Cloud Readiness Assessment Service at ABC, Inc. March 8-16, 2011, and delivered a final report on March 22, 2011. This document constitutes the final *Cloud Readiness Assessment Report* from that engagement. It contains our discoveries and recommendations for continuing your journey to the Cloud.

The value of this Readiness Assessment lies in developing a clear picture of the effort and risk that would be associated with moving specific nominated workloads to Cloud services, whether Public, Private, Community, or Hybrid. In cases where a Discovery Assessment has previously been performed, the information gleaned during that discovery process becomes the starting point for Readiness evaluations.

Workload prioritization is formulated by consideration of (a) expected benefit to the business (financial, operational, or both); (b) feasibility of migrating the workload in question, including dependencies on other workloads; and (c) consideration of the severity of risk associated with migration difficulties. When considering business benefit, it is important to consciously consider imminent events, such as regulatory changes, which will force substantial changes to the company's technology base, especially in the areas of processing capacity, storage capacity and retention, and software licensing.

The key business driver for looking at the Cloud at this time is the imminent software license fee renewal which is due at the end of June 2011, coupled with an expected significant IT performance increase due to the release of your new Apex product line.

This report offers first-level tactical recommendations for moving to the Cloud, guided by earlier work in Strategy and Discovery. This report is not intended to be used as a detailed statement of work nor does it expressly represent an offer of the services or solution associated with the estimates provided. This report is intended to identify viable projects for migrating specific workloads to Cloud Services with positive business benefit. Subsequent project phases will focus on developing complete, detailed implementation plans and cost estimates should you, or we jointly, decide to pursue this Cloud strategy.

We appreciate the prompt, frank and open conversations we had with the members of the ABC Inc. extended team.

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Executive Summary

The Cloud Readiness Assessment is designed to prepare you for implementing a Cloud service. Utilizing Purposeful Clouds reference architectures and blueprints to formulate the basis for standardizing Cloud solutions, our approach expedites the adoption of common services and simplifies your transition to Cloud Computing based on a reusable model. The goal is to provide Cloud solutions that serve as a ready class of services that you can easily implement and/or integrate with existing IT services. This approach provides significant savings early in the adoption of the Cloud by reducing the implementation schedule and ensuring you are satisfied each step of the way as they pursue an IT strategy based on leveraging the Cloud.

The Cloud Readiness assessment provides a thorough review of your existing IT environment as it pertains to the desired Cloud service model (i.e. IaaS, PaaS, SaaS) in order to produce a prioritized future state roadmap. Within the context of the roadmap, detailed plans are produced for each identified service to be implemented. Utilizing Purposeful Clouds reference architectures and blueprints to formulate the basis of the future state model, the Cloud Readiness Assessment provides specific recommendations, based on value vs. reward analysis, for implementing each IT service within this project. This approach is flexible, scalable, and reusable with the goal of providing the most value with the least amount of risk. By leveraging Purposeful Clouds blueprints, the proven methodology attempts to:

- Formulate and identify the key drivers for a future environment organized around the stated problem, goals, and the identified Cloud opportunity dimensions
- Prioritize implementation of Cloud services and map your workload-specific requirements to potential Cloud Service Provider offerings
- Identify impact of Cloud services with existing IT management services
- Map new Cloud services within the context of a future state model based on best practices and analysis of your workloads aligned with your business strategy
- Establish a successful path for implementation and execution of Cloud services
- Review costs and expected benefits from implementing Cloud services

We worked with the following key people from ABC, Inc:

- Jillian Jones, CIO
- Gale Garrison, CFO
- Robert Roberts, VP, Corporate IT

- Sherry Smith, Database Administrator
- Adam Abraham, Manager of Network Operations
- Jim Johnson, Manager of IT Operations
- Bill Williams, Director of *OrderNow* Development

Shortly after the actual on-site session, we conducted brief phone calls with:

- Ms. Garrison and Nancy Narrows from your external Auditor, Good Auditor, LLC.
- George Gilroy from your external HR and payroll service, Happy Pay Day Corp.
- Mr. Johnson and Mr. Abraham.

We used the output from the prior Discovery Assessment conducted in February.

While the recommendations developed during the Strategy Workshop were largely confirmed, we did arrive at some additional refinements. Much of this adjustment is based on ABC's concern that interaction with CSPs and operation on CSP resources be carefully and completely validated before any Production-related commitments are made. The refined strategy is:

1. Move your development, test and support (Dev/Test) environment into the Public Cloud as Infrastructure as a Service (IaaS), with the exception of the performance test equipment.
2. Define a Disaster Recovery (DR) environment for the *OrderNow* application in the IaaS Public Cloud implementation created in Phase 1.
3. Move your other production applications, such as the *GenBoviNow* bovine genetics application, into the Public Cloud as Platform as a Service (PaaS).
4. Add your Business Intelligence (BI) workload to the PaaS Public Cloud implementation created in Phase 3.
5. Move your *OrderNow* performance testing into a Private Cloud as IaaS.
6. Move your production *OrderNow* to a separate Private Cloud as IaaS.
7. Develop a hosting environment for the *OrderNow* application for existing or new customers in a separate Private Cloud as Software as a Service (SaaS).

Our financial analysis is not yet definitive, but has been refined during this Readiness Assessment. Based on our current investigation, our estimates are that completion of the first phase will take approximately two months and, when completed, will save approximately \$30K in reduced server-related costs during the first year (measured from the start of the project). The completion of the second phase will take approximately an additional two months, and save approximately

another \$30K during the first year. If ABC completes all five phases, our revised estimates suggest savings of between 30% and 50% of the total annual IT budget on an ongoing basis, while providing the resources necessary to support your historical annual growth and the introduction of Apex.

Due to the depreciation schedule for some of your existing equipment and software license terms, the break-even point will be approximately one year after the project starts. There will be an estimated initial spend of less than \$50K over the first four months for service and start-up costs, which have been factored into the break-even calculations.

We presented our findings to CEO Wayne Williams, Ms. Jones, and Ms. Garrison on 15 April 2011.

Document Intent

This document contains our detailed evaluation of the feasibility of introducing Cloud Services for ABC as identified during the earlier Strategy Workshop and Discovery Assessment. The following sections contain:

- An **Introduction** to the **Cloud Readiness Assessment Methodology** and its value to ABC, Inc.
- The **Cloud Readiness Assessment Findings**, including
 - Overall system description, assessment, and transformation strategy, and
 - Detailed assessment and transition strategy for specific Workload sets
- The **Overall ROI and TCO Outlook** as refined based on the information gathered during the assessment.
- **Next Steps** that we suggest ABC, Inc. should take on its journey to the Cloud.
- **The Appendix** contains a set of first-level Migration Plan outlines for each Workload; an overall Migration/Transformation Plan; a Future State Architecture description; and references to, or excerpts from, information sources drawn upon to conduct this Assessment.

Introduction

The Cloud Readiness Assessment Methodology

The Cloud Readiness Assessment is part of the Planning Phase of our Service Methodology. It is based on the information discovered in our Cloud Discovery Assessment or similar information obtained by another means. The primary function of the Cloud Readiness Assessment is to determine exactly what needs to be done to move the selected workloads to the Cloud and develop a detailed project plan to accomplish that. The Cloud Readiness assessment provides a thorough review of your existing IT environment as it pertains to the desired Cloud service model (i.e. IaaS, PaaS, SaaS) in order to produce a prioritized future state roadmap. Within the context of the roadmap, detailed plans are produced for each identified service to be implemented.

The exact length of a particular Cloud Readiness Assessment depends on the complexity of the environment and the information available from a Discovery Assessment or other sources. Typically a Cloud Readiness Assessment requires two or three weeks on site plus time spent remotely analyzing the results and preparing the final report.

Objectives

The Cloud Readiness Assessment is a collaborative consulting engagement that assists you in examining probable workloads that are candidates for deployment as Cloud services and provides specific planning to facilitate the transformation to the Cloud during the implementation phase.

The objectives of the Cloud Readiness Assessment consulting project are:

- Map new Cloud services within the context of a future state model based on best practices and analysis of your selected workloads aligned with your business strategy.
- Review the characteristics of each selected workload with respect to factors known to be critical to a successful Cloud migration, or to be significant impediments or risks. Where appropriate, identify a mitigation strategy.
- Identify/review Cloud service providers to satisfy service requirements.
- Incorporate existing IT management policies/procedures, security policies and disaster recovery, archive and backup requirements into your implementation.
- Prioritize the implementation of the selected workloads and map workload-specific requirements to potential Cloud Service Provider offerings.

- Identify the impact on existing IT services.
- Conduct a financial review of comparable IT services.
- Create project-specific plans for approved workloads and Cloud services. These plans include:
 - Transition into the Cloud without interruption to your business.
 - Matching security requirements.
 - Matching performance and uptime SLAs.
 - Transition back from the Cloud.

CSP Capability Verification / Selection

Purposeful Clouds maintains a “CSP Characteristics” knowledge base which tracks a number of service and performance dimensions for many CSPs. The results of this Readiness Assessment are used to develop a “Client Cloud Requirements Summary” that is structured along the same lines; the two can then be compared to rapidly identify the best CSP candidates for a successful cloud migration.

CSP Characteristics include, for example, such factors as:

- IaaS: x86 CPU rating range, RAM allocation range, local storage allocation range
- PaaS: Windows Server versions supported; Linux versions supported; Unix versions supported; storage allocation granularity
- Network: Access/Egress bandwidth guaranteed; Protocols supported; Protocol constraints; Firewall options; VPN capability
- Reliability: Number of resource sites; ability to shift work to a different site; network redundancy; site emergency preparedness; built-in DR provisions
- Logistics: average implementation lead time; percentage of on-time implementations; incident response time SLAs; provision for physical-media data transfer
- Fiduciary: Invoice level of detail; electronic usage/invoice data access; company rating (Moody’s or similar)

This is discussed further in the section on “CSP Suitability Outlook” found below. The actual selection process is not in scope for this Readiness Assessment; rather, we confirm that the perceived requirements can be satisfied, realistically, by one or more of the competitors in the CSP industry.

Engagement Components

The engagement consisted of the following:

- **The Pre-Assessment Preparation:** A Purposeful Clouds organized project kick-off call with all the critical parties involved in the assessment, accomplishing the following objectives:
 - Introduce the roles and responsibilities of project stakeholders.
 - Confirm the objectives of the assessment and the targeted workloads.
 - Identify network and storage operational personnel, and operational and system subject matter experts for the targeted workloads.
 - Define the process for the report delivery.
- **An On-site Assessment Service:** Interviews and reviews of existing documents using the following criteria to evaluate each targeted workload:
 - Geographical (location, cost, facilities, risk, ...).
 - Workload functionality.
 - Desired capacity and growth estimates (business and IT).
 - DR strategy.
 - Network, storage and backup, data center operations, monitoring, and security.
 - Business and IT drivers.
 - Transition plan.
 - Financial considerations.
- **Post-assessment Analysis:** Preparation of the *Cloud Readiness Assessment Report* (this report), which includes topics such as:
 - Summary of key findings and a strategic approach to the Cloud.
 - Future State Architecture leveraging Cloud Computing.
 - Short-term Cloud implementation priorities and dependencies.
 - Financial analysis of targeted workloads.
 - Maintenance and Support strategy.
 - Cloud adoption and operational impact.
 - Training plans, if required.
- **Presentation** of the *Cloud Readiness Assessment Report*:
 - Conduct a follow-up meeting (a 1-2 hour online presentation) to review the key findings as defined in the report.
 - Determine and agree on the next steps and the scope of any subsequent assessments or other tasks to be performed.

- Identify any modifications to the report that you may request before final distribution.

Summary of Previously Obtained Information

This section contains the summary results from a Cloud Strategy Workshop and Cloud Discovery Assessment performed for this customer, or from other sources which provided equivalent information.

In this case, we summarize from

- The *Cloud Strategy Workshop Final Report* delivered on 27 January 2011, based on the Cloud Strategy Workshop held at ABC, Inc. on 18 January 2011. In that workshop we found a number of opportunities for ABC to gain financial and other business benefits from the Cloud.
- The *Cloud Discovery Assessment Report* delivered on 22 February 2011, wherein we refined some of the Strategy findings.

Overall Environment

ABC, Inc. has one datacenter located in its corporate headquarters in Madison, Wisconsin. The entire IT infrastructure is in one large room in the basement with separate and redundant air conditioning. Backup power is provided by a diesel generator, but it can only power approximately half of the existing equipment. During power failures, only the production *OrderNow* servers and storage components are powered plus the entire network infrastructure. All servers are running Windows Server 2008 R2 with SP1. Everything in the production environment is virtualized except for the *OrderNow* servers. The development environment is mostly virtualized except for the Visual SourceSafe server and test servers used during performance testing.

Equipment and Facilities

The current server inventory is 67 two-socket servers and 4 four-socket servers (for the production and performance test *OrderNow* databases). These are allocated roughly as shown below.

	Web	Application	Database	Other
Production	5	20	2	
BI	2	2 (20 VMs)	1	
Other		12 (30 VMs)		
Dev/Test	2	2	1	7
Performance Testing (QA)	3	10	2	
Total	12	46 (+50 VMs)	6	7

Network and Storage

The infrastructure is quite flat, with security measures only at the edges. Servers are manually repurposed between production and development as needed. This has sometimes caused problems when a developer has accidentally “borrowed” or rebooted a live production server.

All network-based storage (NAS or SAN) is on one string of EMC disk with redundant controllers, RAID 10. Total usable storage on site is approximately 5TB, but only approximately 1.6TB is in use.

Operations

You have a small IT operations staff with shift-based schedules to cover the periods 7AM to 10PM Monday to Friday, and 7AM to 1PM on Saturday. Your development team steps in when there are problems.

Backup is predominantly manual, but fairly effective given ABC’s availability requirements. Each evening, the second shift operations manager takes a DVD of the day’s *OrderNow* audit files to his home, approximately 20 miles from the datacenter. Each weekend, ABC makes a complete backup of the *OrderNow* system to a 1TB portable hard drive, which is swapped with another drive stored in a safe deposit box in the ABC’s bank’s main office downtown Madison.

Visual SourceSafe backups are automatically made each evening over the Internet to servers in the homes of Mr. Williams and Betty White, his testing manager.

High-Level Cloud Strategy

Based on the information provided, we had made the following specific recommendations, for seven phases comprising the movement of specific ABC workloads to the Cloud:

1. Move your Dev/Test environment into the Public Cloud as Infrastructure as a Service, with the exception of the performance test equipment.
2. Define a Disaster Recovery environment for the *OrderNow* application in the IaaS Public Cloud implementation created in Phase 1, based on the Dev/Test environment that you validated in Phase 1.
3. Move your other production applications, such as the *GenBoviNow* bovine genetics application, into the Public Cloud as Platform as a Service.
4. Add your BI workload to the PaaS Public Cloud implementation created in Phase 3.
5. Move your *OrderNow* performance testing into a Private Cloud as IaaS.
6. Move your production *OrderNow* to a separate Private Cloud as IaaS.

7. Develop a hosting environment for the *OrderNow* application for your existing or new customers to a separate Private Cloud, providing it to your customers via an SaaS model.

We confirmed that there are two other potential opportunities, which require further investigation:

- A very brief analysis of your *OrderNow* performance requirements indicates that it might be possible to run it on MySQL instead of Oracle RAC, potentially saving \$240K per year in Oracle license fees. This would have to be verified, at some engineering cost. If you choose to pursue this opportunity, we strongly suggest that this be done as a separate phase and not as part of either phase 5 or phase 6. You could also shift from SQL to MySQL for your BI system at the same time, saving some additional license fees.
- At a convenient time, not dependent on any of the preceding actions, consider moving the RT Incident Tracking system (Request Tracker, from BestPractical.com) to SaaS.

Adjustments to Draft Strategy

During the course of the Readiness Assessment, we concluded that it would be best to adjust the Strategy in the following ways:

1. The initial moves will be incremental, with graceful back-out, to minimize disruption and risk of prolonged outages while familiarity is gained.
2. For DR purposes (see (2) above), focus on the Performance Testing environment, which is closer to a full-scale Production configuration. Phase 2 will now entail implementing Performance Testing in the Public Cloud as IaaS; development of a DR plan will be continued in parallel with other activities. This means that Step 2 and Step 5, above, will reverse positions in the sequence.

Cloud Readiness Assessment Findings

This section summarizes Purposeful Cloud findings from the Cloud Readiness Assessment and the follow-on phone calls.

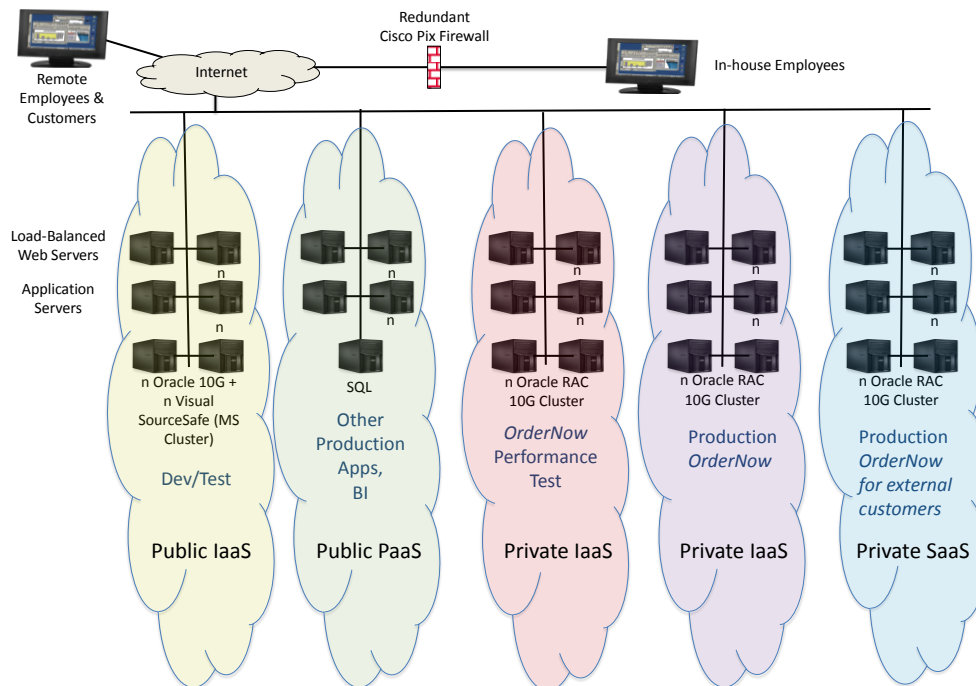
Future State Architecture

The original recommendations deriving from the Cloud Strategy Workshop were largely confirmed; some adjustments were made in transition strategies.

The end-state architecture will encompass three Cloud regions:

- Private Cloud, IaaS, for *OrderNow* Production
- Public Cloud, IaaS, for *OrderNow* Dev/Test
- Private Cloud, IaaS, for *OrderNow* Performance Testing
- Public Cloud, PaaS, for BI and remaining Production applications

In addition, DR provisions will be developed using the Private Cloud configuration established for *OrderNow* performance testing.



Short-term Cloud Implementation Priorities

We propose an overall approach of incremental adoption. Once confidence has been gained at each stage, additional transitions may be of larger granularity.

We would like to complete the migration within 12 months, to enable avoidance of equipment upgrades, HVAC expansion, and maintenance contract renewals.

We will begin by moving one of the simplest, lowest-risk workload subsets: the Web Servers associated with Dev/Test. This will validate the basic arrangements for IaaS resource acquisition and invocation, while having both low operational risk and simple fallback mechanics.

We will follow that with migration of App Servers and Database Servers for Dev/Test. This will also provide a heuristic validation of our expectations for transmission or replication of databases.

These migrations will be followed by QA (Performance Test); BI; other Production; *OrderNow* Performance Testing; and finally *OrderNow* Production.

During the course of this Assessment, we concluded that there is substantial advantage to moving the Performance Testing complex to Public IaaS, based on the ephemeral nature of usage. Since Performance Testing is only active 4 to 6 times per year, the benefit of as-needed processing and storage capacity outweighs the challenge of transferring an appropriate image of the database in preparation for actual testing. This environment is also perfectly suited to DR, assuming that we can perform database loads within the necessary recovery-time windows.

OrderNow Dev/Test

As previously observed, we began with the Dev/Test complex in support of *OrderNow*. This has the probable lowest impact on operations, as well as a change-tolerant user base. The purpose of the Readiness Assessment is to ascertain feasibility and potential complications. Some high-level factors are described here; a dependency matrix “checklist” follows.

Note that we make reference to a “QA” environment. In earlier analyses, this has sometimes been called “Performance Test”; based on this Readiness Assessment, we have deemed it more appropriate to classify it as “QA”, applied to issues of both Function and Performance.

Application Description

OrderNow is a three-tier .Net application, with an underlying Oracle database (currently running RAC in production). The Dev/Test environments are managed according to general Best Practices:

- Work in Progress is conducted in the Development environment; Visual SourceSafe is employed for version control.
- Release candidates are promoted to Test via ABC's Application System Change Management process. When approved for promotion, a code base is frozen in VSS, and scheduled for movement to the Test environment. The Test environment contains a well-known database sample, reduced in size from Production, but including many historical problem-case entries.
- Prior to Promotion to Production, the code set is copied to the QA environment for Functional Acceptance Testing and/or Performance Testing. There are a number of scripts which are employed, using Netvantage Functional Tester, to perform basic conformance testing against incremental functional specifications as well as regression testing. There are also a number of scripts which are used with WebPerformance Load Tester to conduct first-level Performance (Load) Testing with respect to SLA expectations. Once these have passed, operator-driven test scripts are executed and evaluated.
- Ultimate promotion to Production is also managed through the ABC Application System Change Management process. Once complete, Dev work is reviewed for synchronization to the now-current code base.

In addition to the systems used for testing, there are two Visual SourceSafe servers, in a cluster configuration, used by the Development teams. A complement of servers (currently 5) is maintained for ad hoc assignment to developers for discrete testing activities.

Application and System Software Requirements

This environment depends on certain environmental elements for code management, and others for test execution. Chief among them are:

- Windows Server 2008
- Microsoft SQL*Server 2008 (for VSS)
- Microsoft Visual SourceSafe
- Developer copies of Visual Studio 2008, including C++, Basic, C#, and F#.
- MSMQ for message handling
- Oracle 10
- SCOM for instrumentation during QA testing, and for diagnostic activity during Unit Testing and System Testing.
- Internet Explorer Version 7 (and possibly higher)

These are detailed, including license counts and persistence expectations, in the Dependency Matrix at the end of this section.

Database Requirements

The current QA environment employs Oracle 10 RAC for consistency with Production. Unless and until there is a firm plan to abandon Oracle RAC in favor of alternative solutions (which we believe will be advisable), the CSP must support Oracle 10 RAC. There will also be Microsoft SQL*Server nodes.

Storage volumes are detailed below. Most of these can and should be satisfied with local storage, or possibly NAS; a handful of cases will require SAN capabilities.

Performance Requirements

For Functional and Unit Test activities, Performance Requirements are modest. Service times within the actual modules of *OrderNow* are not considered in Performance Requirements; in part, that is the province of the system engineering that these domains support. For environmental factors,

- It is expected that transmission times for messages between user nodes and the web server(s) is on the order of 500ms for 80% of messages.
- It is expected that messages between App Servers and Database Servers are transmitted at data-center speeds – nominally 10ms.
- It is expected that messages between Web Servers and App Servers may vary in transmission time depending upon scenario. ABC wishes to maintain an architecture and design which permits placement of Web and App servers in different locations, implying that (http) message transmission times of 500 ms (90th percentile) are acceptable.
- For QA, the same performance levels are expected – but at the 95th percentile rather than the 80th.

Availability Requirements

Availability during normal operation is expected to be 99.9% between 0700 and 2000 Central time.

Development, Test, and QA are all eligible for pre-scheduled maintenance interruptions of (up to) 24 hours, with 3 business days' notice.

Security Requirements

Access to Development is controlled by UserID and Password, within ABC's AD domain.

Access to QA at the User level is controlled by UserID/Password.

Access to QA at the SysAdmin level is controlled by UserID/Password plus SecureID token.

Data encryption due to privacy or sensitivity considerations:

- Data-in-motion: encryption not required.
- Data-at-rest: encryption not required.

For DR considerations, RTO = 24 hours, RPO = 2 hours

RTO: Recovery Time Objective. This is the objective for elapsed time before restoral of system operation.

RPO: Recovery Point Objective. This is the (largest) time window for changes to have been lost in the process of re-establishing operation. For example, an RPO of 2 hours would indicate that any updates made during the 2 hours immediately prior to the service interruption which invoked DR may be lost.

Storage Requirements

Present-day storage needs and near-term expansion/contraction expectations are shown below.

Realm	Element	Number of Instances	Storage Size (per instance)	Type	12-month Growth
Dev	Web Server	2	120 GB	Local	0%
Dev	App Server	2	120 GB	Local	0%
Dev	OrderNow Database	1	20 GB	Local	0%
Dev	VSS (operating software)	2	120 GB	Local	0%
Dev	VSS (source files, etc)	Shared	50 GB	SAN	25%
Dev	General (ad hoc)	3	250 GB	Local	0%
QA	Web Server	5	250 GB	Local	10%
QA	App Server	10	120 GB	Local	10%
QA	Oracle Engine	2	120 GB	Local	0%
QA	OrderNow Database	Shared	500 GB	SAN	15%

Network Requirements

Dev/Test is expected to support 5 to 10 concurrent users, primarily software engineers. Since the bulk of code development takes place under a local (desktop or laptop) instance of Visual Studio (possibly after a code base is retrieved from VSS), we do not need to be concerned with achieving truly “interactive” levels of network service for Dev/Test activity.

For QA (Performance Test), response levels must be in the 1-second range, 95th percentile, between ABC user PCs and the Web Servers within the CSP’s network.

We believe that the existing DS-3 Internet Access Line (15 MB CIR) at ABC Headquarters will be adequate, but will monitor closely during early-stage tests.

Note: this assumes that Internet egress at the CSP site is unconstrained – an assumption that will need empirical verification.

Contingency: if improved Internet access is indicated, we will first investigate the Metro Ethernet offering that Acme Networking has recently announced for an area that includes ABC HQ.

It will be necessary to be able to resolve ABC-INC.com domain names via DNS at either ABC or CSP sites.

Either Aliasing or Bridging between sites will be considered; further analysis is required, and will depend on the capabilities of the candidate CSP.

Other Requirements or Considerations

Other considerations include the items listed below. None of these are perceived as significant threats or risks.

1. CSP support of Windows Server 2008
2. CSP support of Oracle 10
3. CSP support of IP traffic from/to ABC under the following protocols (Port Number sensitivity to be further detailed during Transition Planning): HTTP; HTTPS; Telnet; FTP; SNMP; CIFS/NBT (NetBIOS over TCP)
4. CSP ability to route traffic from ABC Partner companies to ABC eBusiness web servers

Transition-in Plan

Changeover to Cloud-based operation will be incremental and graceful (i.e., back-out will be possible at every step; operational changes for users will be minimal).

1. Two Web Servers for Dev/Test will be created at CSP. These will operate in parallel with the current Development Web Servers initially; the latter will then be turned off (redemption is covered separately).
2. App Servers and DB Servers for Dev/Test will be created at CSP. Changeover to these will be atomic: the existing App and DB servers will be turned off as the CSP-based counterparts are turned on.
3. The QA environment will be defined and pre-loaded over a period of time not yet determined (depends upon final estimates of data mass to be transferred and synchronization strategy). After two successful uses of the CSP-based QA environment, the current ABC-managed QA facilities will be decommissioned (redemption covered separately).

Support & Maintenance Plan

ABC uses WhatsUp for basic NCC (Network Control Center) alerts. These and/or escalations out of the Help Desk provider are transmitted to the Operations support staff via pager or SMS messages; incidents are tracked in an instance of RT (Request Tracker, from BestPractical.com), which also contains contact information for support vendors ranging from Telecom providers to Server Maintenance agencies.

We will need to adjust the System Inventory information in RT to include cases of system residency at a CSP, in addition to simply adding CSP support contact information to the system. Support staff will need to have access to SLA specifications for the CSP(s) as well; this should fit within the framework already used for hardware and network support providers.

We will need to create a process for turning environments ON and OFF at the CSP, to gain the best benefit of on-demand resource use. This will be integrated into the Application System Change Management process:

1. An approved Change Request will generate a Dev/Test environment activation, if not already active.
2. A Change Completion notice will trigger a review for possible deactivation of the Dev/Test environment, if no other related Change work is also active.
3. When QA schedules are approved, the QA environment will be re-activated, from 2 to 10 days prior to the commencement of QA activity, depending on developer pre-conditioning work requirements.
4. When a QA cycle is declared complete and the code set has been successfully promoted to Production, the QA environment will be deactivated, unless there is another QA cycle imminent.

Role & Responsibility Changes

Most roles and responsibilities will be unaffected by this change for Dev/Test. There will be some adjustments:

1. Operations will need to initiate and verify transmission of new system images to the CSP, and inform Application Support when complete so that Promotion actions can be finalized.
2. IT Administration will need to incorporate review and verification of the monthly invoices from CSP, including redistribution of usage logs where appropriate prior to payment authorization.

Training Requirements

Training for Dev/Test migration will include:

- Operator training for CSP Referral and Escalation

- Developer training for
 - IaaS Theory of Operation
 - IaaS Management Functions (for specific CSP chosen)
- IT Admin training for CSP Contract Terms and Invoice Structure

Transition-out Plan

Transition-out for Dev/Test and QA will be relatively straightforward during the course of the overall migration project. It will be slightly more complex after the original resources at ABC's data center have been redeployed.

1. Transition-out during migration
 - a. VSS source code and configuration data will be backed up nightly to removable media, as is currently done.
 - b. If back-out is invoked, we will execute the following steps:
 - i. Freeze development activity.
 - ii. Reactivate the original Dev/Test equipment and VM configurations at the ABC Data Center.
 1. Reload Dev/Test database from pre-migration backups; this should be adequate for Dev/Test purposes.
 2. Recreate the QA database from the Production database, employing existing utilities to transcribe and obfuscate the *OrderNow* data.
 - iii. Reactivate the VSS cluster at the ABC Data Center. Reload source and configuration files from the most-recent removable-media backup.
 - iv. Redirect developers to the original resources as necessary (note: this may all be covered by DNS manipulations; the final plan will resolve this).
 - v. Confirm that QA operation resolves to the QA complex in the ABC Data Center as intended.
 - vi. Lift the development freeze.
2. Transition-out after migration
 - a. First, we must determine whether the transition will be to ABC-owned facilities, or to another CSP or ITO provider.
 - i. If to ABC facilities, acquire or assign a complement of servers and storage, plus VMware licenses.

- b. Build the OS and environment on the new VMs (whether at a new CSP or in the ABC Data Center) from release media and patch files.
- c. Freeze Development activity. Clone the VSS Source and Configuration data onto the new VSS servers.
- d. Rebuild application systems on the new Development, Test, and QA servers.
- e. Transmit the Dev/Test database from CSP to the back-out site using FTP or similar.
- f. Build a QA database from Production at CSP, using established utilities to extract and obfuscate. Generate removable media (portable disk) at CSP and have it shipped to the new location.
- g. When received, copy the data from the portable drive into the QA database.
- h. Redirect developers to the new facilities; re-point DNS; and declare the development freeze to be over.

Interdependencies

While Dev/Test is largely self-contained, the following must be noted:

- Updates to VSS must be coordinated with Visual Studio implementations on developer workstations.
- OS patches for WS2008 at CSP must be under the control of ABC. These will typically be applied to Dev/Test at CSP prior to deployment within other ABC environments.
 - It must also be possible to back out OS patches at CSP in the event of compatibility issues or other complications.
- DNS resolution for ABC-INC.com must be coordinated carefully between ABC and CSP.

CSP Suitability Outlook

For this workload, the operational requirements are entirely within mainstream CSP offerings. We foresee no serious obstacle to achieving this implementation.

CSP selection would be facilitated by enlisting Purposeful Clouds to assist in evaluation, using their CSP Characteristics knowledge base.

{Actual recommendations not included in this sample.}

ROI and TCO Outlook

Since this phase of the project is IaaS, we will consider only server configurations, comparing owned on-site to CSP-provided. We have assumed certain parameters for CSP CPU cost rates; the RFP cycle will make these concrete.

For simplicity's sake, we have omitted consideration of Storage and Network costs.

The refresh rate of 25%/year is based on interviews with ABC Operations staff. The maintenance rate, at 20% of purchase price per year, is based on a review of ABC's current support contracts.

At this level of approximation, this phase of the project yields a *steady-state cost reduction of \$30K/year*.

ABC-Owned	Number	Avg Cost	Maintenance	Refresh Rate	Purchase /Year	Maintenance	Total
Servers	26	\$3,000	\$600	25%	\$19,500	\$15,600	\$35,100
CSP	Number	Hrs/Mo	Cost/Hour	Total/mo		Total/yr	Savings/Yr
VMs	6	264	\$0.05	\$79.20		\$950.40	
	17	96	\$0.15	\$244.80		\$2,937.60	
	3	120	\$0.10	\$36.00		\$432.00	
						\$4,320.00	\$30,780

Summary: Dependency Matrix

The table below highlights considerations related to the migration of this specific Workload.

Item	Sensitivity	Transition Need	ABC Position	Readiness Rating (1-5)
Monitoring	NCC issues	Dev: none QA: minimal	Unimplemented	3 (low readiness, but low need during early stages)
OS Licenses	Count at any one time	5 additional Windows Server licenses during transition	MS-Select, not EA Need to negotiate with MS AE	2
Oracle Licenses	Count	2 or more for graceful migration	Oracle permits temporary use of a supplementary license for 30 days during the course of a transition	4 (must ensure that original license can be deemed transferred within the allowed time period)
Network	Interactive response time	1-sec response time for QA	ISP link is DS-3, 21 MB/sec CIR, burstable to 35 MB/sec	4
Network	Bulk data transfer	Episodic data transfers of about 100GB within 8 hours (roughly 28 Mb/sec throughput needed)	ISP link is DS-3, 21 Mb/sec CIR, burstable to 35 Mb/sec	3 (requires some testing; may need WAN Accelerator or de-duplication equipment on both ends)
<i>{Remainder of table omitted for brevity}</i>				

<Remaining Workloads>

{The other four workloads are omitted for brevity in this sample report.}

Overall ROI and TCO Outlook

We have not performed a complete financial analysis, but based on our current findings, our estimates are that completion of the first phase will take approximately two months and, when completed, will save approximately \$30K in reduced server procurement. The completion of the third phase will take approximately an additional two months and, save approximately another \$30K. If ABC completes all seven phases, our initial estimates suggest savings of between 30% and 50% of the total annual IT budget, while providing the resources necessary to support your historical annual growth and the introduction of Apex. Additional benefits include the introduction of a new Disaster Recovery environment for the *OrderNow*

application, and the capability of offering the *OrderNow* application to your existing and new customers via an SaaS model (estimated additional annual revenue, \$100K).

Due to the depreciation schedule for some of your existing equipment and software license terms, the break-even point will be approximately one year after the project starts. There will be an estimated initial spend of less than \$50K over the first four months for service and start-up costs, which have been factored into the break-even calculations.

A framework that may be helpful for continuing the cash-flow analysis is included as Appendix 4: ROI: Cash Flow Analysis.

Overall Dependency Matrix

The table below highlights common considerations for the total migration process in the context of ABC's current ability to address the requirements or concerns.

Item	Sensitivity	Transition Need	ABC Position	Readiness Rating (1-5)
Monitoring	NCC issues	Dev: none QA: minimal	Unimplemented	3 (low readiness, but low need for early stages)
OS Licenses	Count at any one time	5 additional Windows Server licenses during transition	MS-Select, not EA Need to negotiate with MS AE	2
Oracle Licenses	Count	2 or more for graceful migration	Oracle permits temporary use of a supplementary license for nn days during the course of a transition	4 (must ensure that original license can be deemed transferred within the allowed time period)
Network	Interactive response time	1-sec response time for QA	ISP link is DS-3, 21 MB/sec CIR, burstable to 35 MB/sec	4
Network	Bulk data transfer	Episodic data transfers of about 100GB within 8 hours (roughly 28 Mb/sec throughput needed)	ISP link is DS-3, 21 Mb/sec CIR, burstable to 35 Mb/sec	3 (requires some testing; may need WAN Accelerator or de-duplication equipment on both ends)
<i>Other</i>	<i>Derived from remaining Project phases</i>	<i>Omitted for sample</i>	<i>Omitted for sample</i>	<i>Omitted for sample</i>

Next Steps

At this point, we have offered ABC, Inc. a strategy to move to the Cloud with estimates of risks and benefits, and a tactical approach for achieving these benefits based upon additional investigation. We recommend that ABC proceed with the following steps.

1. Development of detailed Project Plans
2. Secure project authorization and budget
3. CSP Review, Evaluation, and Selection
4. Execute migration plan
5. Finalize and test DR procedures based on use of the QA environment
6. Evaluate migration from Oracle to MySQL or similar for *OrderNow*
7. Consider moving RT to a hosted/SaaS implementation (see <http://www.bestpractical.com/services/hosting.html> or http://www.gossamer-threads.com/hosting/request_tracker.html)

Different workloads can be moving through this process at different speeds and in different places simultaneously, but we recommend that the first workload (Dev/Test) be completely implemented prior to going beyond preparation steps with the next one (BI), so as to ensure acceptance from all of the stakeholders that the Cloud will deliver the predicted benefits at low risk to ABC, Inc.

If you choose to pursue replacing Oracle with mySQL, we suggest that the engineering effort begin as early as practical. Changing the database engine can be a daunting task, and it would be appropriate to do a detailed design effort prior to committing to the actual implementation or counting on the resultant cost savings. That engineering effort should not be undertaken in parallel with moving *OrderNow* to the Cloud. Either complete it prior to moving *OrderNow* to the Cloud (best choice) or wait until after *OrderNow* is comfortably running in the Cloud before starting the database migration.

Purposeful Clouds has enjoyed working with ABC, Inc. on this Cloud Readiness Assessment, and would be pleased to provide any of the additional consulting services outlined in this section.

Appendix

1. Cloud Migration Plan for Each Workload

Preliminary Work

These actions deal with the overall management of CSP resources. Some of them (flagged as “Pre-Imp”) must be undertaken prior to the start of any actual migration work; others can proceed in parallel with Workload Migration projects.

Note: Only a partial list is shown for purposes of this Sample Report.

Pre-Imp	Step	Action
*	1	Issue RFP for CSPs
*	2	Evaluate RFP responses; reduce to Short List
*	3	Determine whether to run multiple pilots
*	4	If chosen, conduct Pilot Tests (using simple workload, tbd)
*	5	Select finalist; negotiate terms
	6	Define CSP Invoice Management process (charge allocation, exception review, etc)
	7	Service Desk: Define VM Request branch for CSP-based implementations
	8	Help Desk: Define scripts for CSP interaction; create branches in existing scripts
	9	Support: Embed SLAs, CSP contacts, and Escalation Rules for L2/L3 in Support KB
	10	Evaluate Private Network Connection option for path between ABC and CSP
	11	Determine best option for Operational Alerts (CSP feeds or ABC agent installation)
	12	Integrate Operational Alerts
	13	Define Capacity Review process using logs and performance data
	14	Define emergency capacity adjustment process

Dev/Test

Steps, in sequence, are listed here for this phase of the move. Creation of a full-scale Project Plan, with Dependencies, Predecessor/Successor relationships, Resource Requirements, Task Durations, and so forth would be the province of an Implementation Planning engagement.

Note: Only Dev/Test is shown for purposes of this Sample Report.

Phase	Step	Action
1	1	Briefing for Developers: overall strategy and plan
1	2	Freeze Web Server development
1	3	Build VSS environment at CSP; transfer initial data set
1	4	Establish synchronization between VSS/ABC and VSS/CSP
1	5	Create Web Server instances, IaaS, at CSP
1	6	Build Web Servers from VSS at CSP (using alt DNS name)
1	7	Briefing for Developers: How to Work With VSS at CSP
1	8	Perform discrete functional testing of new Web Servers
1	9	Review test results; resolve issues; repeat tests if necessary
1	10	Construct IP Bridge for Dev/Test address range(s)
1	11	Rebuild Web Servers with ABC-Inc.com names; test
1	12	Turn off onsite Web Servers
1	13	Review invoice from CSP
1	14	Create Database VM at CSP
1	15	Build Database VM from VSS/CSP
1	16	Transfer test database image to CSP
1	17	Create App Server VMs at CSP
1	18	Build App Server VMs from VSS/CSP
1	19	Conduct end-to-end testing of Dev/Test at CSP
1	20	Review results; remediate and repeat if necessary
1	21	Cut over all Dev/Test activity to CSP
1	22	Schedule and conduct regular weekly reviews with Developers

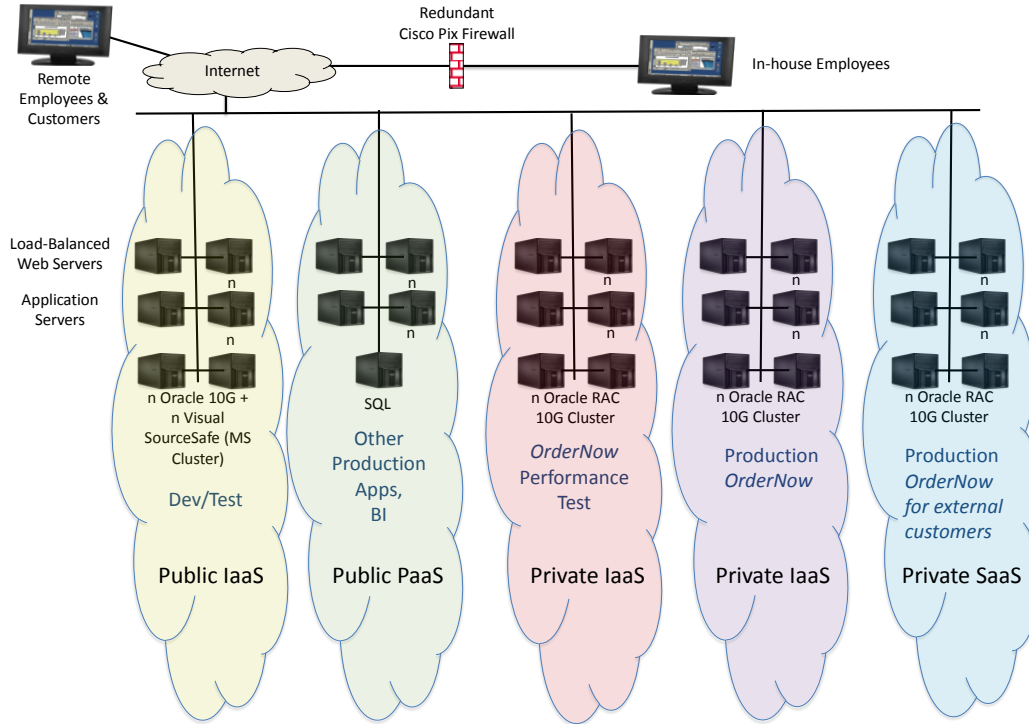
2. Overall Cloud Migration Plan

This sections presents a higher-level Master Project Plan, intended to be more appropriate for Program Management purposes than the fully-articulated plans as shown above.

Note: Not shown for purposes of this Sample Report.

3. Future Architecture

CSP RFP Requirements



Summary Resource Requirements

This configuration summary will be employed to develop RFP specifics, as well as future-state cost estimates based on probable existence times for each group of servers.

Realm	Element	Vehicle	Storage Size	Qty	Existence Hours/Mo
Dev	Web Server	x86, 1x, 4GB	120 GB	2	264
Dev	App Server	x86, 2x, 8GB	120 GB	2	264
Dev	OrderNow Database	SAN (or NAS)	20 GB	1	744
Dev	VSS (operating software)	x86, 1x, 8GB	120 GB	2	264
Dev	VSS (source files, etc)	SAN	50 GB	Shared	744
Dev	General (ad hoc)	x86, 1x, 4GB	250 GB	3	120
QA	Web Server	x86, 2x, 8GB	250 GB	5	96
QA	App Server	x86, 4x, 16GB	120 GB	10	96
QA	Oracle Engine	x86, 4x, 32GB	120 GB	2	96
QA	OrderNow Database	SAN	500 GB	Shared	240
NOTES	Assumed Developer activity is 12 hours/day, 22 hours/mo				
	Dev SAN data retained full-time (may reconsider in light of mount/unmount options)				
	QA assumed 8 12-hour days on average; database retained full-time, 2 additional days				

{Additional data – PaaS configurations, Production resources, and Network Traffic estimates – are omitted from this sample report}

4. ROI: Cash Flow Analysis

This spreadsheet is used to guide collection of the factors which may be affected by the proposed migration, both directly and indirectly. Once populated, a set of time-based *pro formas* can be constructed to support the ROI analysis.

{Table truncated for this sample report}

Ref	Category	Area	Factor	Metric	Ties to
1	Env	Power	Consumption	Cost/kwH	
2	Env	CRAC	CRAC acquisition	Cost/20-ton	4
3	Env	CRAC	CRAC maintenance	\$/yr/20-ton	
4	Env	CRAC	Power	kw/hr to run	2
5	Servers	HW	Acquisition	Typical cost by category	
6	Servers	HW	Expansion	Additional servers per year, by type	
7	Servers	HW	Refresh	Routine upgrades per year, by type	
8	Servers	Typical	Power	kw/hr to run	2
9	Servers	Typical	Heat	BTU/hr generated	3
10	Servers	Typical	Space	Servers per rack (24x30)	
11	Servers	Typical	Maintenance	HW maintenance contract or incident	
12	Servers	VM	VMware license	Cost for complement required	
13	Servers	OS	License, Windows	Acquisition cost, new	
14	Servers	OS	Maintenance, Windows	SW Advantage or pro-rated upgrade cost	
15	Network	Eq	Switch ports for servers	Acquisition cost per port	
16	Network	BW	ISP access line cost	Varies by bracket and type	
17	Network	Eq	Power	kw/hr per switch port (prorated)	

5. Prior Information Sources

Purposeful Clouds “Cloud Strategy Workshop Final Report,” prepared for ABC, Inc.
Jan 2011

Purposeful Clouds “Cloud Discovery Assessment Final Report,” prepared for ABC,
Inc. Feb 2011

ABC “*OrderNow* Installation and Operations Manual,” Nov 2010

GenBovi “*GenBoviNow* Installation and Operations Manual,” Apr 2007

ABC “IT Operations Processes and Procedures Manual,” June 2008

For questions, contact Purposeful Clouds at services@PurposefulClouds.com.

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