

Current Cloud Technologies

Chapter Four

Topics

- Traditional technologies and cloud alternatives compared
- Leveraging Software as a Service (SaaS)
- Developing within Platform as a Service (PaaS)
- Implementing Infrastructure as a Service (IaaS)
- Empowering mobile computing

Comparing Traditional Technologies and Cloud Alternatives

- Transformation from a traditional data center and network enterprise toward services hosted in the cloud does not change users expectations or desires concerning capability and familiar interfaces.

TABLE 4.1 Examples of traditional and cloud equivalents to various application technologies

Technology	Traditional	Cloud Equivalent
User productivity suite	Microsoft Office	Office 365
	OpenOffice	Google Apps
	Lotusphere	Zoho
Audio/video production	Adobe Premiere	Aviary
	Camtasia	NovaCut
	ACID/Sound Forge	WeVideo
Photo manipulation	Adobe Photoshop	Pixlr
Business intelligence	Great Plains	Net Suite
	Quest	SalesForce
	Oracle BI Suite	Workday
File storage	Windows Server	Ubuntu One
	NetApp	SkyDrive
	EMC	Dropbox
Server virtualization	VMware	RackSpace
	Hyper-V	Amazon EC2
	XEN	Windows Azure

Traditional Desktop Software

- Requires client installation.
- Available only to consumers accessing the application from the client.
- Requires other mechanisms for sharing.

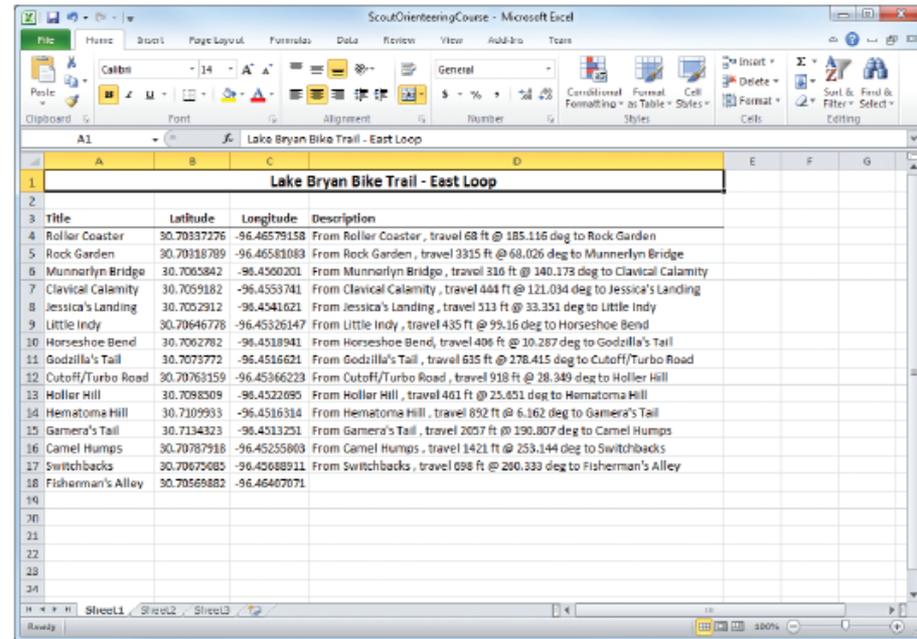


FIGURE 4.1 Microsoft Excel spreadsheet displaying a chart of GPS coordinates from a BSA orienteering bike trek

Cloud Based Alternatives

- Reasonably complete
 - May lack features such as macros or other active components.
- Accessible from machines lacking installed applications.
 - Google Docs, Office Live, etc.
- Access possible from any browser-enabled device
 - PCs
 - Laptops
 - Tablets
 - Smart Phone.

Other Cloud Advantages

- Relative ease by which documents created by and stored within the cloud can be shared.
- Zoho is intended for use as a stand-alone primary user productivity suite includes:
 - User macros
 - Pivot tables
 - Includes sharing and publishing options in header toolbar.
- Full-featured audio and video multimedia development production suites are available in the cloud.

Less Technical Support Required

- Cloud-based alternatives rapidly becoming functional replacements
 - No longer requiring the technical support necessary for traditional enterprise installed and maintained applications.
- User can access cloud applications through the same interface they use to access traditional.

Networking in the Cloud

- TCP/IP standard key element.
 - Makes global TCP/IP interconnectivity possible.
- Includes functions like the DNS.
 - Also includes a suite of protocols that facilitate data transport using various mechanisms.
- Protocols and their functions grouped into Open Systems Interconnection (OSI) model.

Web Access Architecture

- Applies to cloud service access in both private (local network) and public (via the Internet) configurations.
- Thin client systems rely on server-based applications and services to take the place of locally stored resources in traditional workstations
 - Often providing only basic input and output functions (keyboard, mouse, audio, video) and a network connection.

Leveraging Software as a Service

- So far, majority of applications have been Software as a Service (SaaS).
 - Packages that consumers just use as they would any other prebuilt application.
- Flexibility is a key factor of the application's design.
- Further end user development may not be possible.

Personal Software as a Service Apps

Traditional apps such as Microsoft's Excel and Adobe's After Effects require:

- Application purchase
- Application installation on client
- Regular update and patching maintenance
- Cycle repeats as upgrades and updates must be purchased and installed.

Cloud Apps

Cloud apps like Zoho's spreadsheet only require licensing and a browser.

- No outright software purchases
- No installation
- No patch or update maintenance.



Details Handled by Hosting Corporation's Technical Staff

- At simplest, cloud SaaS apps exist simply as web-accessible components.
 - Connectivity across multiple platforms handled by the cloud service.
- Cloud SaaS also offers complex fully featured applications accessed within a web browser.
- Instead of requiring all enterprise users to settle on a limited number of application suites installed on particular machines, users can use cloud SaaS offerings from home or work without additional cost.

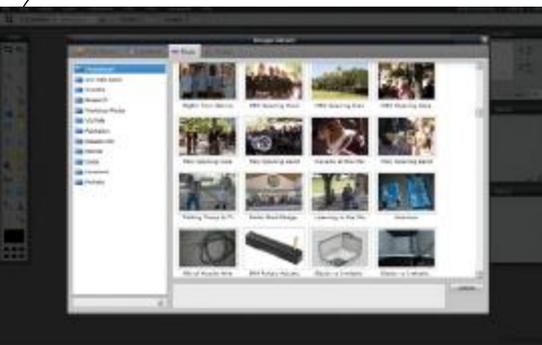


FIGURE 4.13 Pixlr accessing images stored in Kirk's Flickr folders

Web Accessed

- Because cloud applications are web-enabled, they also consume other cloud services very well to add information availability beyond that of resources on file servers located in the traditional data center.
- Figure 4.13 demonstrates Pixlr's access to Kirk's images stored locally as well as in popular social media collections such as Flickr, Picasa, and Facebook.
- Images produced by Pixlr can also be shared with other consumers within Pixlr's own cloud storage service.

Enterprise Software as a Service Apps

- Can also enable aggregation of data across multiple individuals, sites, or organizations.
- Next slide presents a standard business intelligence (BI) balanced scorecard within the enterprise NetSuite application.
- Traditional enterprise applications that have been translated into the cloud include:
 - Enterprise Dashboards
 - Customer relations management
 - Payroll
 - HR services.

Dashboard

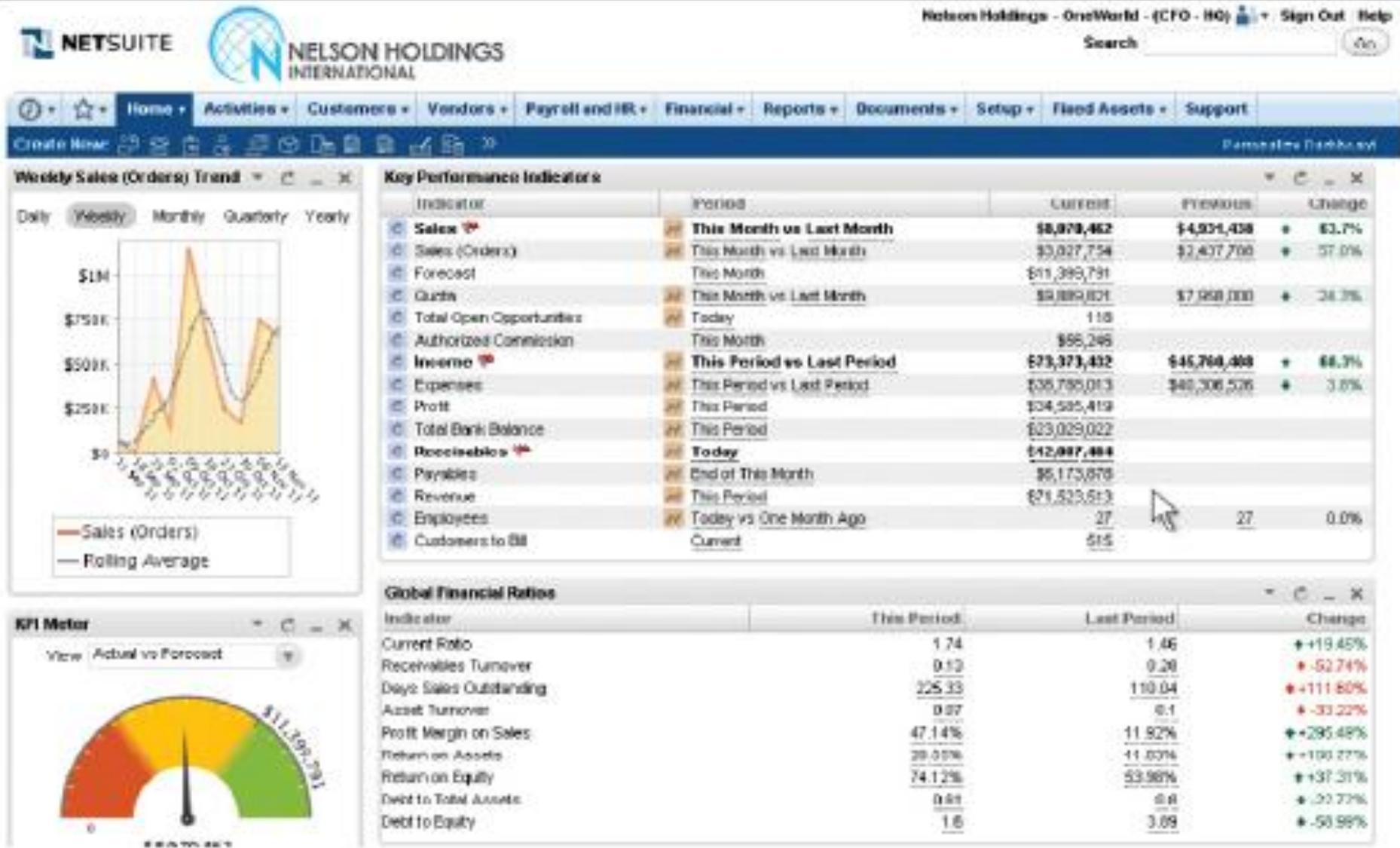
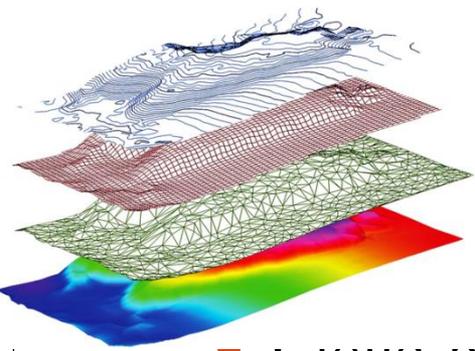


FIGURE 4.14 NetSuite balanced scorecard showing enterprise sales data and projections

Cloud-Specific Software as a Service Applications

- Provisioning enterprise applications remains a task that the IT staff will need to maintain, but it exists as a process for adding different licensing and access control assignments for a particular user's account so that, for example:
 - UserA might have access to sales data
 - UserB has access to HR details
 - UserC has only read-only levels of access to the London office's particular details.
- Software as a Service (SaaS) applications go beyond simple apps and replication of traditional desktop applications, extending into new technologies only possible through access to big data resource pools or by performing tasks requiring high-performance computing (HPC).



Photogrammetry

- Cloud-based 123D Catch performs a supercomputing process called photogrammetry technologies like Apple's iPad and iPhone for direct input of photographic imagery.
- Cloud service calculates the photogrammatic shape on its own resources and notifies the user when a final object mesh is available for download.
- Photogrammetry requires significant CPU power to calculate the object's spatial dimensions
 - Versions of the application's access interface exist for low-power mobile

Developing within Platform as a Service

- Platform as a Service (PaaS) allows development of customized and personalized applications.
- Traditional application development closely aligned with cloud PaaS application development.
 - Many of the same tools are used to develop, test, and deploy apps.
- Development staff may only need to direct their applications to different hosting sites, easing cloud transition.
- Because available languages and development tools are determined by PaaS provider, proprietary lock-in is a potential factor.

Application development within Microsoft's Azure PaaS cloud service, using Visual Studio.

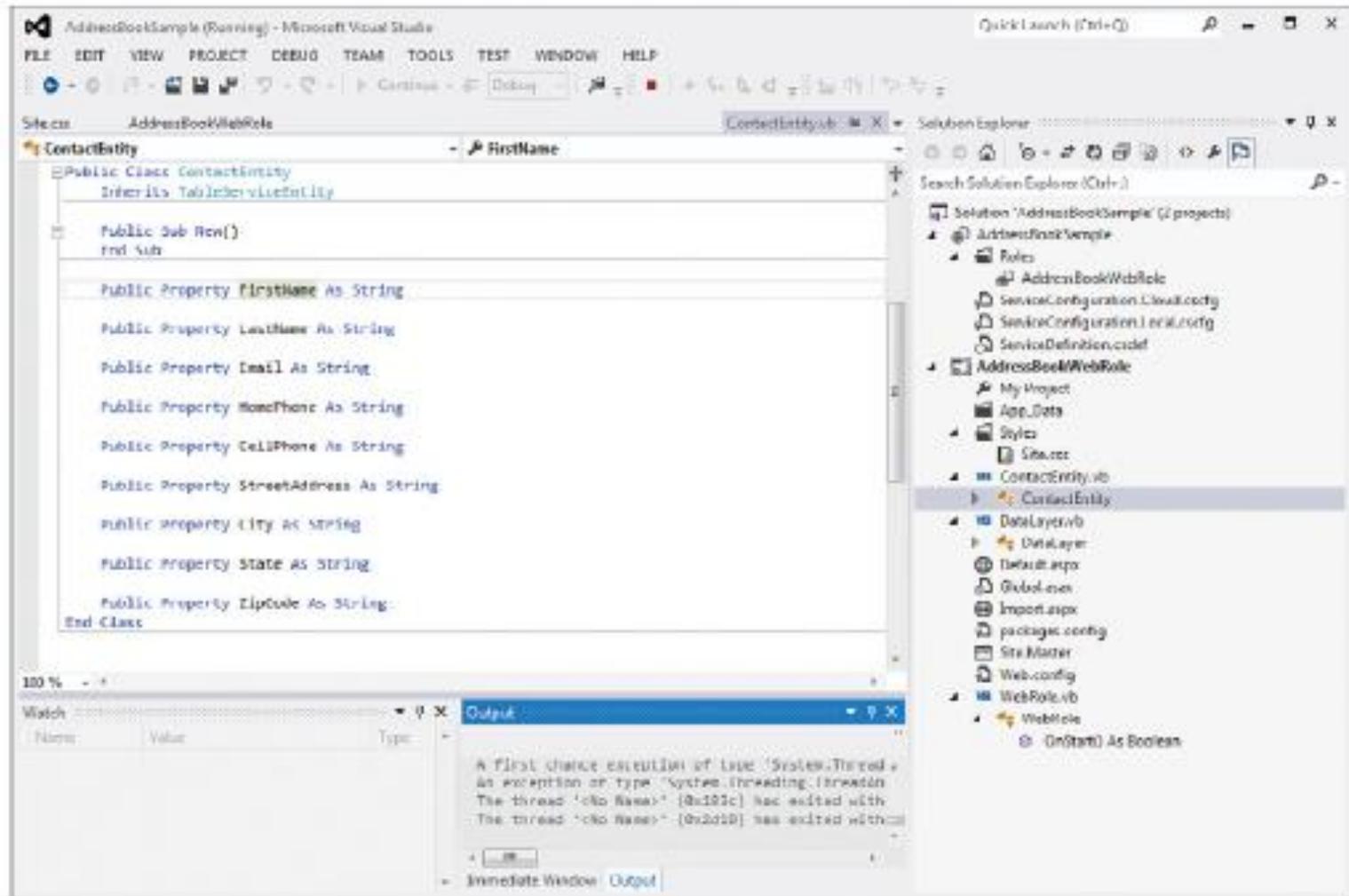


FIGURE 4.16 Cloud application development within the popular Microsoft Visual Studio interface



Avoiding Vendor Lock in

- For example, applications developed in C# for Microsoft's Azure PaaS would not be directly compatible with applications developed for Salesforce's Force.com PaaS environment.
- Unlike SaaS software that is updated and maintained entirely by the service provider, PaaS applications are developed, deployed, updated, and otherwise maintained by an organization's own development staff.
- When staff develops for applications operating in the cloud, resources and services can be accessed by users from within a browser and updates automatically available.

Implementing Infrastructure as a Service

- IaaS provides the greatest level of customization and flexibility.
- In traditional organizations, infrastructure is managed through purchase of physical servers that must be housed, interconnected, and cooled in data center.
 - Hardware maintenance is responsibility of IT staff.
 - System downtime may be required during the update process.
- IaaS can involve storage resources, databases, or entire virtual systems complete with their own applications.

Cloud Environment

- Issues such as the cost of power and cooling are dealt with by provider
 - Economies of scale
 - Location of cloud data centers in areas with lower energy costs.
- Private IaaS cloud environments exist entirely atop resources in local data center.
 - All maintenance and management of hardware-level support remain the responsibility of IT staff.
- In private IaaS deployments, cloud services function as flexible pools of virtualized resources
 - In effect simply a further evolution of virtualization.

Spawning New VMs

- Many IaaS providers such as Rackspace, Google, GoGrid, and Windows Azure offer the ability to spawn new storage, database, and virtual machine instances as necessary
 - within a pool of resources made available through an organization's resource licensing agreements.
- In the IaaS scenario, resources are managed and reviewed through dashboards like the one shown in the next slide.

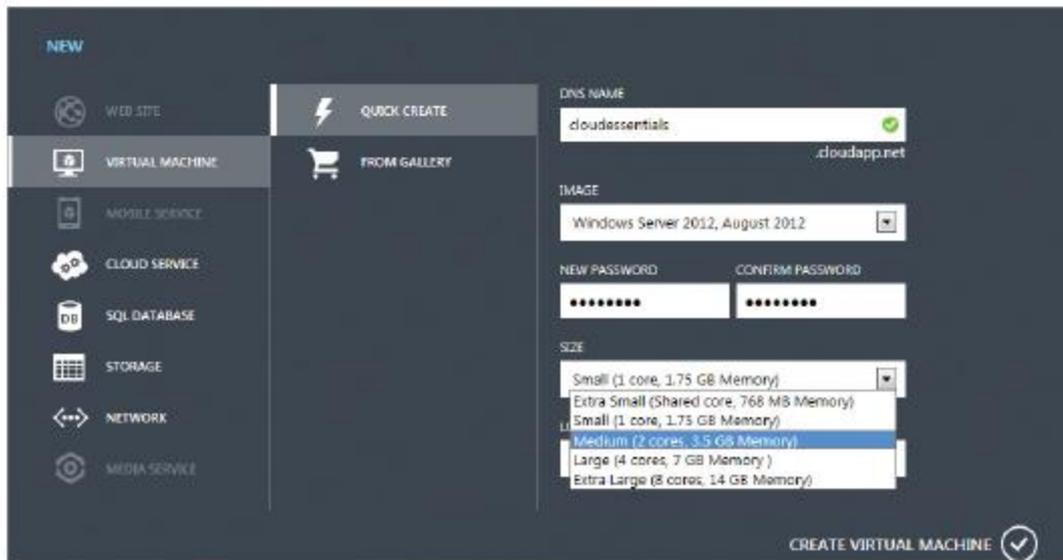


FIGURE 4.21 Creating a new server instance within the Windows Azure management interface

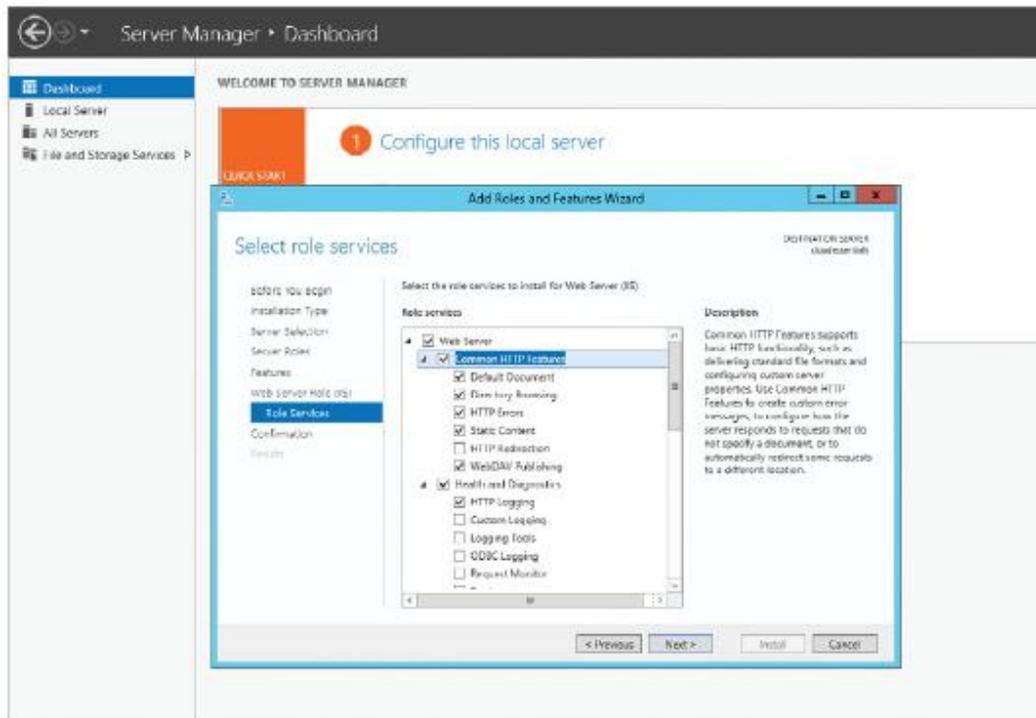


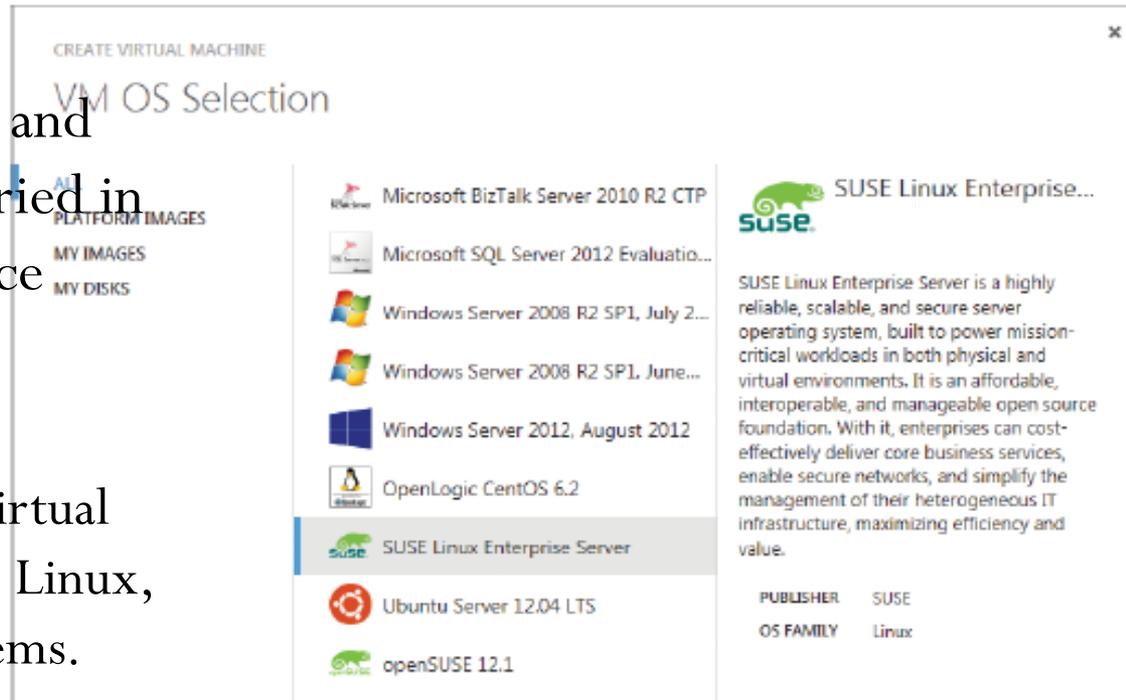
FIGURE 4.22 Configuring a new instance as a web server

Scability

- Additional processing cores, memory, and storage can be added to a cloud server to meet growing need or can be reduced or reallocated to other purposes.
 - Capital expenditures for server hardware can be transformed into operating expenses for resources used in public cloud IaaS offerings.
- As shown in previous slide, new instances can be created by consumers
- As shown on the previous page, each new IaaS server can be configured to provide specific services using a simple web-based management interface.

Configuration

- Resource configuration, development languages, and even platform can be varied in Infrastructure as a Service (IaaS) cloud offerings as desired.
 - Including configuring virtual servers using Windows, Linux, or other operating systems.



- The figure to the right illustrates current virtual machine images available for rapid instance creation in Windows Azure.
FIGURE 4.23 Selecting an operating system for a new virtual server instance within the Windows Azure cloud IaaS environment

Azure

- Note that even though Azure is a Microsoft IaaS cloud platform, consumers can create servers using SUSE Linux, Ubuntu, or CentOS.
- In contrast to PaaS, proprietary lock-in is lessened in full IaaS solutions because the consumer selects details for their virtualized infrastructure.

Empowering Mobile Computing

- Cloud services transform mobile devices into sophisticated computing interfaces able to accomplish many tasks beyond their local resource limitations.
- Many cloud solutions move CPU-intensive and resource-consuming processing to the service host, while the mobile device serves as a data input and presentation interface.
- Very similar to the cloud/thin client interaction where cloud services run atop server hardware and only pass input/output data to the consuming.

Multimedia Sharing

Figure 4.24 is an example of the Ubuntu One service running on an Android phone, displaying files automatically synchronized between several devices through the cloud service.

- Music and other forms of data can be played across multiple platforms using this service.

- Shazam is a cloud-based analysis service that allows the capture of a segment of ambient audio, called a tag, which it then uses to identify the music that is playing on the background.

- Tagged music can be streamed from an integrated service like YouTube or shared to other cloud-based social media and file sharing services.



FIGURE 4.24 Mobile access to files stored in the Ubuntu One cloud service

Questions???