LAB Getting Started Labs
https://docs.microsoft.com/en-us/azure/#get-started

Deploy infrastructure

1) Linux virtual machines
2) Windows virtual machines

Secure and manage resources

1) Azure Security Center
2) Azure Monitor
3) Azure Application Insights
4) Azure Cost Management
5) Azure Backup
6) Azure Site Recovery
7) Azure Migrate
8) Azure Policy

Develop apps

- .NET
- Python
- Java
- PHP
- Node.js
- Go

App Models

- Web Apps
- Serverless Functions
- Containers
- Microservices with Service Fabric

Manage data and AI

Relational Databases

- SQL database as a service
- SQL Data Warehouse as a service
- PostgreSQL database as a service
- MySQL database as a service

NoSQL

- Azure Cosmos DB

Storage

- Blob Storage

AI and Cognitive Services

- Machine Learning
- Cognitive Services

https://docs.microsoft.com/en-us/azure/#get-started

LAB Attendee Challenge – What Azure challenges should we tackle? What Challenges Are You Facing?

Examples:

1) Contoso Purchases Fabrikam and needs to Migrate Fabrikam to Contoso or Azure
2) How to Architect Networks Using Isolation Security Zones to Enhance Security Posture When Moving to Azure
3) What challenges are YOU facing?

Linux Labs Using Cloud Shell

Linux Labs if you do not have access to SSH or you want to use Azure Cloud Shell

- Linux 1. Create and Manage Linux VMs with the Azure CLI 2.0 in Azure Cloud Shell
- Linux 2a. Install a LAMP web server on a Linux virtual machine in Azure
- Linux 2b. Install a LEMP web server on a Linux virtual machine in Azure
- Linux 2c. Create a MongoDB, Express, AngularJS, and Node.js (MEAN) stack on a Linux virtual machine in Azure
- Linux 3. Monitor and update a Linux virtual machine in Azure using Cloud Shell
- Linux 4. Use Azure Security Center to monitor Linux virtual machines
- Linux Bonus. Prepare a Debian VHD for Azure – Prereq's Hyper-V and Debian .ISO

https://docs.microsoft.com/en-us/azure/virtual-machines/linux

LAB Linux 1. Create and Manage Linux VMs with the Azure CLI 2.0 in Azure Cloud Shell

You learn how to:

1) Create and connect to a VM
2) Select and use VM images
3) View and use specific VM sizes
4) Resize a VM
5) View and understand VM state
6) [Optional] Manage Disks: https://docs.microsoft.com/en-us/azure/virtual-machines/linux/tutorial-manage-disks

Important Notes

1. Use your Initials1514 or other unique code for variables to prevent any duplicate public urls e.g. (lowercase):
   - dan1514vm for "myVM"
2. Stop and Deallocate or Delete resources when done with **ALL** labs (you can reuse these machines for the next few labs but do not forget to go back after done with labs)

https://docs.microsoft.com/en-us/azure/virtual-machines/linux/tutorial-manage-vm

LAB Linux 2a. Install a LAMP web server on a Linux virtual machine in Azure

You learn how to:

1) Create an Ubuntu VM
2) Open port 80 for web traffic
3) Install Apache, MySQL, and PHP
4) Verify installation and configuration
5) Install WordPress on the LAMP server

Important Notes

1. Use your Initials1514 or other unique code for variables to prevent any duplicate public urls e.g. (lowercase):
   - dan1514vm for "myVM"
2. Stop and Deallocate or Delete resources when done with **ALL** labs (you can reuse these machines for the next few labs but do not forget to go back after done with labs)

https://docs.microsoft.com/en-us/azure/virtual-machines/linux/tutorial-lamp-stack

LAB Linux 2b. Install a LEMP web server on a Linux virtual machine in Azure

You learn how to:

1) Create an Ubuntu VM (the 'L' in the LEMP stack)
2) Open port 80 for web traffic
3) Install NGINX, MySQL, and PHP
4) Verify installation and configuration
5) Install WordPress on the LEMP server

Important Notes

1. Use your Initials1514 or other unique code for variables to prevent any duplicate public urls e.g. (lowercase):
   - dan1514vm for "myVM"
2. Stop and Deallocate or Delete resources when done with **ALL** labs (you can reuse these machines for the next few labs but do not forget to go back after done with labs)

https://docs.microsoft.com/en-us/azure/virtual-machines/linux/tutorial-lemp-stack

LAB Linux 2c. Create a MongoDB, Express, AngularJS, and Node.js (MEAN) stack on a Linux virtual machine in Azure

You learn how to:

1) Create a Linux VM
2) Install Node.js
3) Install MongoDB and set up the server
4) Install Express and set up routes to the server
5) Access the routes with AngularJS
6) Run the application

Important Notes

1. Use your Initials1514 or other unique code for variables to prevent any duplicate public urls e.g. (lowercase):
   - dan1514vm for "myVM"
2. Stop and Deallocate or Delete resources when done with **ALL** labs (you can reuse these machines for the next few labs but do not forget to go back after done with labs)

https://docs.microsoft.com/en-us/azure/virtual-machines/linux/tutorial-mean-stack

LAB Linux 3. Monitor and update a Linux virtual machine in Azure using Cloud Shell

You learn how to:

1) Enable boot diagnostics on the VM
2) View boot diagnostics
3) View host metrics
4) Enable diagnostics extension on the VM
5) View VM metrics
6) Create alerts based on diagnostic metrics
7) Manage package updates
8) Monitor changes and inventory
9) Set up advanced monitoring

Important Notes

1. Use your Initials0514 or other unique code for variables to prevent any duplicate public urls e.g. (lowercase):
   - dan1514vm for "myVM"
   - If you did not delete your VMs from another lab, you can use that VM instead of creating one
2. Deallocate or Delete the resources when done with the labs
3. Do not create the VM Scale Set – we do not have enough Azure Credits ☹

https://docs.microsoft.com/en-us/azure/virtual-machines/linux/tutorial-monitoring

LAB Linux 4. Use Azure Security Center to monitor Linux virtual machines

You learn how to:

1) Set up data collection
2) Set up security policies
3) View and fix configuration health issues
4) Review detected threats

Important Notes

1. Use VMs from prior labs
2. Stop and Deallocate or Delete resources when done with ALL labs

https://docs.microsoft.com/en-us/azure/virtual-machines/linux/tutorial-azure-security

LAB Linux Bonus. Prepare a Debian VHD for Azure – Prereq's Hyper-V and Debian .ISO

You learn how to:

1) Use Azure-Manage to create Debian VHDs
2) Manually prepare a Debian VHD

Important Notes

1. This section assumes that you have already installed a Debian Linux operating system from an .iso file downloaded from the Debian website to a virtual hard disk. Multiple tools exist to create .vhd files; Hyper-V is only one example. For instructions using Hyper-V, see Install the Hyper-V Role and Configure a Virtual Machine.
2. Please see also General Linux Installation Notes for more tips on preparing Linux for Azure.

SEE ALSO:

Information for Non-Endorsed Distributions

https://docs.microsoft.com/en-us/azure/virtual-machines/linux/create-upload-generic

https://docs.microsoft.com/en-us/azure/virtual-machines/linux/debian-create-upload-vhd

Windows Labs Using Cloud Shell

Windows Labs if you do not have access to RDP or you want to use Azure Cloud Shell

- Win 1. Creating a VM from an Azure Resource Manager template using Cloud Shell – PowerShell
- Win 2a. Create a Windows virtual machine install IIS with the Azure CLI 2.0
- Win 2b. Install the SQL\IIS\.NET stack in a Windows VM with Azure Cloud Shell
- Win 3. Monitor and update a Windows virtual machine in Azure using Cloud Shell
- 4. Use Azure Security Center to monitor Windows virtual machines

https://docs.microsoft.com/en-us/azure/virtual-machines/windows

LAB Win 1. Creating a VM from an Azure Resource Manager template using Cloud Shell - PowerShell

You learn how to:

A. Use Azure Cloud Shell
B. Create an availability set
C. Create a VM in an availability set
D. Check available VM sizes
E. Check Azure Advisor

Important Notes

1. Use your Initials1514 or other unique code for variables to prevent any duplicate public urls e.g. (lowercase):
   - dan1514IP for "myPublicIpAddress"
   - dan1514vm for "myVM"
2. Stop and Deallocate or Delete resources when done with **ALL** labs (you can reuse these machines for the next few labs but do not forget to go back after done with labs)
3. Do not create the VM Scale Set – we do not have enough Azure Credits ☹

https://docs.microsoft.com/en-us/azure/virtual-machines/linux/tutorial-manage-vm

LAB Win 2a. Create a Windows virtual machine install IIS with the Azure CLI 2.0

You learn how to:

A. Use Azure Cloud Shell
B. Create a Resource Group
C. Create a VM
D. Install IIS
E. Open Port 80
F. Connect via RDP and HTTP
G. Delete Resource Group

Important Notes

1. Use your Initials1514 or other unique code for variables to prevent any duplicate public urls e.g. (lowercase):
   - dan1514vm for "myVM"
2. Stop and Deallocate or Delete resources when done with **ALL** labs (you can reuse these machines for the next few labs but do not forget to go back after done with labs)

https://docs.microsoft.com/en-us/azure/virtual-machines/windows/quick-create-cli

LAB Win 2b. Install the SQL\IIS\.NET stack in a Windows VM with Azure Cloud Shell

Azure Security Center can help you gain visibility into your Azure resource security practices. Security Center offers integrated security monitoring. It can detect threats that otherwise might go unnoticed. In this tutorial, you learn about Azure Security Center, and how to:

1) Create a VM
2) Install IIS and the .NET Core SDK on the VM
3) Create a VM running SQL Server
4) Install the SQL Server extension

Important Notes

1. Use your Initials0514 or other unique code for variables to prevent any duplicate public urls e.g. (lowercase):
   - dan0514iisip for “myIISPublicIpAddress”
   - dan1514vmiis for “IISVM”
2. Stop and Deallocate or Delete resources when done with ALL labs (After Security Lab 4)

https://docs.microsoft.com/en-us/azure/virtual-machines/windows/tutorial-iis-sql

LAB Win 3. Monitor and update a Windows virtual machine in Azure using Cloud Shell

You learn how to:

1) Use PowerShell or Azure Cloud Shell
2) Enable boot diagnostics on a VM
3) View boot diagnostics
4) View VM host metrics
5) Install the diagnostics extension
6) View VM metrics
7) Create an alert
8) Manage Windows updates
9) Monitor changes and inventory
10) Set up advanced monitoring

Important Notes

1. Use your Initials0514 or other unique code for variables to prevent any duplicate public urls e.g. (lowercase):
   - dan0514ip for "myIISPublicIpAddress"
   - dan1514vm for "myVM"
   - If you did not delete your VMs from another lab, you can use that VM instead of creating one
2. Deallocate or Delete the resources when done with the labs
3. Do not create the VM Scale Set – we do not have enough Azure Credits ☹

https://docs.microsoft.com/en-us/azure/virtual-machines/windows/tutorial-monitoring

LAB 4. Use Azure Security Center to monitor Windows virtual machines

Azure Security Center can help you gain visibility into your Azure resource security practices. Security Center offers integrated security monitoring. It can detect threats that otherwise might go unnoticed. In this tutorial, you learn about Azure Security Center, and how to:

1) Set up data collection
2) Set up security policies
3) View and fix configuration health issues
4) Review detected threats

Important Notes

1. Use VMs from prior labs
2. Stop and Deallocate or Delete resources when done with ALL labs

https://docs.microsoft.com/en-us/azure/virtual-machines/windows/tutorial-iis-sql

LAB Containers

1) **Create your first container** https://blogs.technet.microsoft.com/canitpro/2017/08/02/step-by-step-first-steps-with-azure-container-services/
2) **More ways to create containers** https://docs.microsoft.com/en-us/azure/container-instances/

LAB Compute & Networking

1) **Multi-NIC Virtual Machine Creation using Two Subnets**
   https://github.com/Azure/azure-quickstart-templates/blob/master/101-1vm-2nics-2subnets-1vnet/
2) **Create a virtual network using PowerShell**
   https://docs.microsoft.com/en-us/azure/virtual-network/virtual-networks-create-vnet-arm-ps
3) **Create a virtual network using the Azure CLI**
   https://docs.microsoft.com/en-us/azure/virtual-network/virtual-networks-create-vnet-arm-cli

http://github.com/guruskill/70-535

LAB Storage and Operational Readiness

1) **Getting Started with Storage - Manage Storage Account - in .Net** https://azure.microsoft.com/en-us/resources/samples/storage-dotnet-manage-storage-accounts/
2) **Desired State Configuration (DSC)** https://docs.microsoft.com/en-us/azure/automation/automation-dsc-getting-started
3) **How Azure Backup Works in 10 mins** https://docs.microsoft.com/en-us/azure/backup/backup-try-azure-backup-in-10-mins

More Storage: https://azure.microsoft.com/en-us/resources/samples/?service=storage

LAB Labs

1. **Multi-NIC Virtual Machine Creation using Two Subnets**
   https://github.com/Azure/azure-quickstart-templates/blob/master/101-1vm-2nics-2subnets-1vnet
2. **Create a virtual network using PowerShell**
   https://docs.microsoft.com/en-us/azure/virtual-network/virtual-networks-create-vnet-arm-ps
3. **Create a virtual network using the Azure CLI**
   https://docs.microsoft.com/en-us/azure/virtual-network/virtual-networks-create-vnet-arm-cli
4. **Create your first container**
   https://blogs.technet.microsoft.com/canitpro/2017/08/02/step-by-step-first-steps-with-azure-container-services/
5. **More ways to create containers**
   https://docs.microsoft.com/en-us/azure/container-instances/
6. **Getting Started with Storage - Manage Storage Account - in .Net**
   https://azure.microsoft.com/en-us/resources/samples/storage-dotnet-manage-storage-accounts/

   Authentication: Broken Link in lab Use: https://docs.microsoft.com/en-us/dotnet/azure/dotnet-sdk-azure-authenticate?view=azure-dotnet
7. **Desired State Configuration (DSC)**
   https://docs.microsoft.com/en-us/azure/automation/automation-dsc-getting-started
8. **How Azure Backup Works in 10 mins**
   https://docs.microsoft.com/en-us/azure/backup/backup-try-azure-backup-in-10-mins

More... http://github.com/guruskill/70-535

Azure Quick Start Templates https://github.com/Azure/azure-quickstart-templates

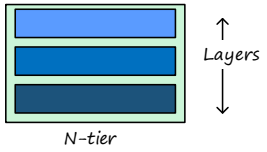
Thought Experiment / Case Study Labs Architecting Solutions on the Whiteboard

Team or Individual Exercises

Answers are NOT in the slides.
There are no wrong answers (unless answer does not solve the problem).
Is there a better answer? Keep digging to find the best solutions.

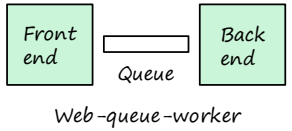
- Case 1: Web App – Solution Design / Architectural Design Contoso Vacation Application Migration to Azure
- Case 2: Contoso Acquisition and Migration of Fabrikam
- Case 3a: Operational Design - INDIVIDUAL
- Case 3b: Operational Design - TEAM
- Case 4: Using Isolation Security Zones to Enhance Security Posture

Lab Setup: Architecture Styles



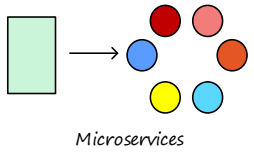
N-tier

- Traditional enterprise architecture
- Ideal for lift-and-shift



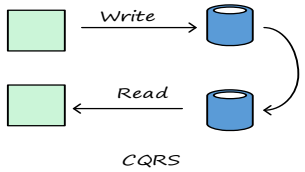
Web-Queue-Worker

- PaaS solutions
- Relies on asynchronous messaging



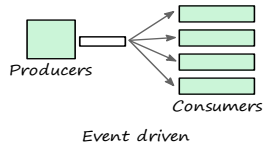
Microservices

- Many small, independent services
- Requires mature DevOps processes



CQRS (Command and Query Responsibility Segregation)

- Scale the read and write workloads independently; Large Scale
- For collaborative domains where many users access the same data



Event-driven

- Producers publish, consumers subscribe
- Common with large data volumes (e.g. IoT)

Big Data & Big Compute

- Parallel processing of chunks across large dataset
- Parallel computations across large number of cores

Design Considerations

- Scale
- Complexity
- Cost
- Manageability
- Service-Level Agreement

Architecture Styles

- **Know when to choose a particular style, based on benefits, challenges, and best practices**

Technology Choices

- **Recognize Azure services that can be used for compute and data services**

Reference: https://docs.microsoft.com/en-us/azure/architecture/guide/

LAB Thought Experiment / Case Study 1 Web App - SOLUTION DESIGN

Break Into Teams of 5-8

Prepare report to be delivered to CA during your next meeting
Include any clarifying questions or additional observations in report

Background: Contoso Vacations is a full-service travel agency with operations across North America and Europe. As part of a campaign to gain market share in emerging tourism trends, Contoso recently acquired Fabrikam Adventures, a small agritourism company that helps vacationers find and book working vacations on farms and ranches. As part of the acquisition, Contoso has decided to sunset all but three of Fabrikam's existing applications.

You are a team of Cloud Architects at Contoso Vacations. The Chief Architect (CA) has just sent an email that was forwarded to you for collaboration, asking for your help on a special project.

Subject: Need plan to migrate 3 Fabrikam apps to Azure

I wanted to give you a status update on the datacenter consolidation project. I got word from the Steering Committee that the target data for decommissioning the Fabrikam datacenter will be the end of Q3, when their cage lease expires. The plan is for all their legacy LOB apps to be sunset and folded into our corresponding Contoso LOB apps. That leaves them with three customer-facing apps to continue supporting after the DC closes.

These three applications will be migrated to Azure, so that Fabrikam's existing datacenter can be decommissioned. The applications that will be migrated to Azure include:

GoFabrikam.com – Fabrikam's customer-facing website lets vacationers browse, search, and book trips. The current website is an asp.net application that runs on IIS and SQL Server 2014 SP2. Traffic volume to this website is low, but performance needs to be reliable in order to capture every potential booking.

Agri-Hub – Fabrikam's partner-facing website is used by farm operators to enter and update inventory, manage reservations and customer charges, and coordinate revenue payments from Fabrikam. The partner website is a section of the main website, but uses a SQL server 2008 (SP4) backend for reservations. It also has several custom APIs and scheduled batch process jobs that were written in Java, PHP, and C#, which allow the reservation system to integrate with several 3rd party service providers, including airlines, credit card processors, and banks.

Farm Viewer –Fabrikam provides real-time data about each farm on their website. Visitors can research information about crops, livestock, weather, and harvest activities as they book their trips. This information is collected by IoT sensors at each farm. The sensor data are sent to a web service, where they are collected and stored in a MongoDB database. The information is then accessed and displayed on the main website.

Desired Outcome:

For each of the three workflows identified as candidates to move to Azure, identify an architecture style for the target-state solution, and create a high-level solution design that indicates the Azure services that you plan on using. You do not need to specify service configurations or other details at this point; however, please be prepared to justify your decision in terms of features, cost, and quality.

Resources:

Azure Architecture Styles
Azure Reference Architectures

LAB Case Study #1: Contoso Vacations

Contoso Vacations is a full-service travel agency with operations across North America and Europe. As part of a campaign to gain market share in emerging tourism trends, Contoso recently acquired Fabrikam Adventures, a small agritourism company that helps vacationers find and book working vacations on farms and ranches. As part of the acquisition, Contoso has decided to sunset all but three of Fabrikam's existing applications.

The three applications that remain will be migrated to Azure, so that Fabrikam's existing datacenter can be decommissioned. The three applications that will be migrated to Azure include:

- **GoFabrikam.com** – Fabrikam's customer-facing website lets vacationers browse, search, and book trips. The current website is an asp.net application that runs on IIS and SQL Server 2014 SP2. Traffic volume to this website is low, but performance needs to be reliable in order to capture every potential booking.
- **Agri-Hub** – Fabrikam's partner-facing website is used by farm operators to enter and update inventory, manage reservations and customer charges, and coordinate revenue payments from Fabrikam. The partner website is a section of the main website, but uses a SQL server 2008 (SP4) backend for reservations. It also has several custom APIs and scheduled batch process jobs that were written in Java, PHP, and C#, which allow the reservation system to integrate with several 3rd party service providers, including airlines, credit card processors, and banks.
- **Farm Viewer ("View")** –Fabrikam provides real-time data about each farm on their website. Visitors can research information about crops, livestock, weather, and harvest activities as they book their trips. This information is collected by IoT sensors at each farm. The sensor data are sent to a web service, where they are collected and stored in a MongoDB database. The information is then accessed and displayed on the main website.

Resources:
Azure Architecture Styles
Azure Reference Architectures

https://github.com/guruskill/70-535 Labs folder 70-534-00-Labs.pptx (or .PDF)

LAB

Thought Experiment / Case Study 1 Web App - SOLUTION DESIGN

Break Into Teams of 5-8

Prepare report to to be delivered to CTO during your next meeting
Include any clarifying questions or additional observations in report

Application

- **Architecture: N-tier, Web-queue-worker, Microservices, CQRS, Event-driven**
  - **Design Considerations / Why?: Scale, Complexity, Cost, Manageability, Service-Level Agreement**

GoFabrikam.com –

Agri-Hub –

Farm Viewer -

LAB

Thought Experiment / Case Study #2 Acquisition and Migration of Fabrikam Team Collaboration Exercise

Break Into Teams of 5-8
Prepare report to be delivered to CTO during your next meeting
Include any clarifying questions or additional observations in report

You are the administrator for Contoso. You have more than 100 hosts in your on-premises datacenter. You are replicating and using Site Recovery as part of your BC/DR plan. Contoso just acquired another company, Fabrikam, Inc. The development teams at both Contoso and Fabrikam use Visual Studio and Visual Studio Team Services.

Letter from the CTO:

As you know, we have finalized the acquisition of Fabrikam. I would like for you to come up with a plan of execution for migrating the workloads running in the Fabrikam datacenter. Here are some key points you should understand as you plan for consuming Fabrikam services:

- The lease of the space will be expiring in 9 months at that time we must have everything out. I would prefer that we get everything moved quickly, in the next 4-6 months. Then we can do some cleanup later if needed. We MUST make sure we maintain a high degree of confidence in securing all data as we go through this transition.
- All applications will continue to be used for the foreseeable future.
- It is important to minimize system downtime of Fabrikam services.
- The physical machines at Fabrikam are beyond or nearing their expected usable life.
- We have a directive from leadership to minimize capital expenditures where possible, so we should look at viability of putting services in Azure.
- I would also like you to be conscious of the costs of ongoing maintenance of these services until such a time that they can be evaluated for longer term upkeep projections.
- Where possible, leverage our DevOps practices and switch applications to native cloud apps and serverless compute.
- Some of the Fabrikam apps are already running in containers. Plan on adding these to our existing container infrastructure running on Azure Service Fabric.
- Fabrikam has 5 VMware hosts, 10 Hyper-V hosts and more than 60 VMs. They are running a mix of operating systems, some running Linux but most running Windows Server. The following is a quick list of servers and apps.

  - **46-web applications running on Windows Server and IIS; 4 are only providing API services to applications. Those that use data, use SQL server. All but three are running stateless.**
  - **3-websites running on Linux, Apache, PHP, WordPress**
  - **3-containerized applications running .NET core on Linux**
  - **8-containerized applications running Node.js**

  - **1-Oracle database server**
  - **3-SQL servers running more than 20 databases**
  - **2-Domain Controllers**
  - **2-External DNS servers**
  - **2-Monitoring and reporting servers**
  - **1-file server**
  - **1-3 node cluster for batch processing and analysis running R scripts; usually on a monthly cadence to do analysis of customer purchasing patterns**

Email continued on next slide….

Lab Slide Location: http://github.com/guruskill/70-535 Labs/70-535-00-Labs.pptx or .pdf

LAB

Thought Experiment / Case Study #2
Answer the following questions in a report back to the CTO…

Break Into Teams of 5-8

Prepare report to to be delivered to CTO during your next meeting
Include any clarifying questions or additional observations in report

Email from CTO Continued:

With this in mind, please help me answer the following questions :

1. What site should be used to receive Fabrikam VM services and why?
2. What tool(s) could we use to securely migrate the VM workloads while minimizing downtime?
3. How can we minimize downtime of Fabrikam web services?
4. Can the Linux websites be migrated to serverless compute on Azure? If so, how?
5. What are the best destination services for migration of the IIS websites?
6. What is the best way to move the containers to Azure Container Instances?
7. What are the next steps after an application has been moved to Azure?
8. Is the batch cluster a good candidate for migration to native cloud apps or serverless compute? Why or Why not?
9. Are there any tools to help us understand what is running at Fabrikam and what would be needed for the migration?
10. Is there a tool or service to switch the existing web workloads to the new production location (Azure or Contoso) with little or no downtime?
11. What challenges do you think you need to prepare for?

LAB Thought Experiment / Case Study 3a Operational Design - Individual

Individual Assignment 15 mins
Prepare report to be delivered to Dan during your next meeting
Include any clarifying questions or additional observations in report

Background: You are the architect for Contoso. Your Innovation team would like to deploy new services on Azure to support a new application Contoso is building. You get an email from the head of Innovation with the following request.

Letter from the Director of Innovation:

As part of our new DevOps initiatives, we would like to deploy a new application project into the Azure cloud. We have one such application nearing completion, which is a multi-tier application with a .NET application front end and a SQL Server backend database. There are a number of different components, including a number of API applications that make up the system. The application will need to send and receive data from Contoso's network for various tasks both scheduled and on-demand. As we plan to deploy this application to Azure, can you help us understand how to design for high-availability, monitoring and alerting? This new application is critically important to the business. It is actually creating a new revenue stream for Contoso. I would not be surprised if 3 years from now it became our top flagship product. For some period of time, we will be giving away the high-end services for free to help us get all of our existing customers on the platform and to bring in a massive new pipeline of prospective customers. Let's have a meeting next week to discuss the architecture we should be using to monitor and manage the applications. I will check our calendars and send you an invite.

Thanks so much for your help.

Dan

Desired Outcome: Prepare for your meeting with Dan and report to the class how you will address the following questions:

1. **What services would you use to monitor and scale the application front end?**
2. **What services would you use to monitor and scale the SQL Database?**
3. **What alerts will need to be configured?**
4. **What automation should be put in place to make sure there is not configuration drift?**
5. **What foreseeable challenges do you think you need to discuss in your first meeting with Dan?**

Resources:

LAB Thought Experiment / Case Study 3a Operational Design - Individual

Team Assignment
Break into Teams of 5-8
Prepare report to be delivered to Dan during your next meeting
Include any clarifying questions or additional observations in report

Background: You are the architect for Contoso. Your Innovation team would like to deploy new services on Azure to support a new application Contoso is building. You get an email from the head of Innovation with the following request.

Letter from the Director of Innovation:

As part of our new DevOps initiatives, we would like to deploy a new application project into the Azure cloud. We have one such application nearing completion, which is a multi-tier application with a .NET application front end and a SQL Server backend database. There are a number of different components, including a number of API applications that make up the system. The application will need to send and receive data from Contoso's network for various tasks both scheduled and on-demand. As we plan to deploy this application to Azure, can you help us understand how to design for high-availability, monitoring and alerting? This new application is critically important to the business. It is actually creating a new revenue stream for Contoso. I would not be surprised if 3 years from now it became our top flagship product. For some period of time, we will be giving away the high-end services for free to help us get all of our existing customers on the platform and to bring in a massive new pipeline of prospective customers. Let's have a meeting next week to discuss the architecture we should be using to monitor and manage the applications. I will check our calendars and send you an invite.

Thanks so much for your help.

Dan

Desired Outcome: Prepare for your meeting with Dan and report to the class how you will address the following questions:

1. **What services would you use to monitor and scale the application front end?**
2. **What services would you use to monitor and scale the SQL Database?**
3. **What alerts will need to be configured?**
4. **What automation should be put in place to make sure there is not configuration drift?**
5. **What foreseeable challenges do you think you need to discuss in your first meeting with Dan?**

Resources:

LAB

Thought Experiment / Case Study 4
Using Isolation Security Zones to Enhance Security Posture

Team Assignment
Break into Teams of 5-8
Answer Questions and Draw Network Diagram

Using isolated security zones is an effective way to reduce many types of risks and increase security posture.

For example, many enterprises use a perimeter network to isolate their Internet-facing resources from other parts of their internal network. You can implement the same level of protection in Azure Virtual Network as well. In this case, you have a number of VMs that will be exposed to the Internet. And you have a number of application servers and database servers on the same virtual network.

With this in mind, answer the following questions:

1. What technologies would you use to implement a perimeter network in Azure Virtual Network?
2. How would you design your network topology?

You decide what servers you have in this network

Minimum:

- 1 RDP Server
- 1 File Server
- 1 DC
- 4 application servers
- 1 DB server