### Objective: Describe cloud concepts (20-25%)

Identify the benefits and considerations of using cloud services

* Identify the benefits of cloud computing, such as high availability, scalability, elasticity, agility, and disaster recovery
  + [Top benefits of cloud computing](https://azure.microsoft.com/en-us/overview/what-is-cloud-computing?WT.mc_id=thomasmaurer-blog-thmaure#benefits)
  + [Examples of cloud computing](https://azure.microsoft.com/en-us/overview/examples-of-cloud-computing?WT.mc_id=thomasmaurer-blog-thmaure)
* Identify the differences between Capital Expenditure (CapEx) and Operational Expenditure (OpEx)
  + Microsoft Learn: [Cloud Concepts – Principles of cloud computing](https://docs.microsoft.com/en-us/learn/modules/principles-cloud-computing?WT.mc_id=thomasmaurer-blog-thmaure)
* Describe the consumption-based model
  + [Azure pricing](https://azure.microsoft.com/en-us/pricing?WT.mc_id=thomasmaurer-blog-thmaure)

Describe the differences between categories of cloud services

* Describe the shared responsibility model
  + [Shared responsibility in the cloud](https://docs.microsoft.com/en-us/azure/security/fundamentals/shared-responsibility?WT.mc_id=thomasmaurer-blog-thmaure)
* Describe Infrastructure-as-a-Service (IaaS)
  + [What is IaaS?](https://azure.microsoft.com/en-us/overview/what-is-iaas?WT.mc_id=thomasmaurer-blog-thmaure)
* Describe Platform-as-a-Service (PaaS)
  + [What is PaaS?](https://azure.microsoft.com/en-us/overview/what-is-paas?WT.mc_id=thomasmaurer-blog-thmaure)
* Describe serverless computing
  + [Serverless computing](https://azure.microsoft.com/en-us/overview/serverless-computing?WT.mc_id=thomasmaurer-blog-thmaure)
* Describe Software-as-a-Service (SaaS)
  + [What is SaaS?](https://azure.microsoft.com/en-us/overview/what-is-saas?WT.mc_id=thomasmaurer-blog-thmaure)
* Identify a service type based on a use case
  + [What are the different types of cloud computing services?](https://azure.microsoft.com/en-us/overview/types-of-cloud-computing?WT.mc_id=thomasmaurer-blog-thmaure)

Describe the differences between types of cloud computing

* Define cloud computing
  + [The Definition of Cloud Computing](https://www.thomasmaurer.ch/2013/06/the-definition-of-cloud-computing?WT.mc_id=thomasmaurer-blog-thmaure) (thomasmaurer.ch)
* Describe public cloud
  + [Learn more about public cloud computing](https://azure.microsoft.com/en-us/overview/what-is-a-public-cloud?WT.mc_id=thomasmaurer-blog-thmaure)
* Describe private cloud
  + [Learn more about private cloud computing](https://azure.microsoft.com/en-us/overview/what-is-a-private-cloud?WT.mc_id=thomasmaurer-blog-thmaure)
* Describe hybrid cloud
  + [Learn more about hybrid cloud computing](https://azure.microsoft.com/en-us/overview/what-is-hybrid-cloud-computing?WT.mc_id=thomasmaurer-blog-thmaure)
* Compare and contrast the three types of cloud computing
  + [What are public, private, and hybrid clouds?](https://azure.microsoft.com/en-us/overview/what-are-private-public-hybrid-clouds?WT.mc_id=thomasmaurer-blog-thmaure)

### Objective: Describe core Azure services (15-20%)

Describe the core Azure architectural components

* Describe the benefit and usage of Regions and Region Pairs
  + [Azure global infrastructure](https://azure.microsoft.com/en-us/global-infrastructure?WT.mc_id=thomasmaurer-blog-thmaure)
  + [Azure regions](https://azure.microsoft.com/en-us/global-infrastructure/regions?WT.mc_id=thomasmaurer-blog-thmaure)
* Describe the benefit and usage of Availability Zones
  + [What are Availability Zones in Azure?](https://docs.microsoft.com/en-us/azure/availability-zones/az-overview?WT.mc_id=thomasmaurer-blog-thmaure)
* Describe the benefit and usage of Resource Groups
  + [Azure Resource Manager overview](https://docs.microsoft.com/en-us/azure/azure-resource-manager/management/overview?WT.mc_id=thomasmaurer-blog-thmaure)
* Describe the benefit and usage of Subscriptions
  + [Azure subscription and service limits, quotas, and constraints](https://docs.microsoft.com/en-us/azure/azure-resource-manager/management/azure-subscription-service-limits?WT.mc_id=thomasmaurer-blog-thmaure)
* Describe the benefit and usage of Management Groups
  + [Organize your resources with Azure management groups](https://docs.microsoft.com/en-us/azure/governance/management-groups/overview?WT.mc_id=thomasmaurer-blog-thmaure)
* Describe the benefit and usage of Azure Resource Manager
  + [Azure Resource Manager overview](https://docs.microsoft.com/en-us/azure/azure-resource-manager/management/overview?WT.mc_id=thomasmaurer-blog-thmaure)
* Explain Azure resources
  + [Azure resource providers and types](https://docs.microsoft.com/en-us/azure/azure-resource-manager/management/resource-providers-and-types?WT.mc_id=thomasmaurer-blog-thmaure)

Describe core resources available in Azure

* Describe the benefits and usage of Virtual Machines, Azure App Services, Azure Container Instances (ACI), Azure Kubernetes Service (AKS), and Windows Virtual Desktop
  + [Azure Compute](https://azure.microsoft.com/en-us/product-categories/compute?WT.mc_id=thomasmaurer-blog-thmaure)
  + [Virtual Machines](https://azure.microsoft.com/en-us/services/virtual-machines?WT.mc_id=thomasmaurer-blog-thmaure)
  + [App Service](https://azure.microsoft.com/en-us/services/app-service?WT.mc_id=thomasmaurer-blog-thmaure)
  + [Container Instances](https://azure.microsoft.com/en-us/services/container-instances?WT.mc_id=thomasmaurer-blog-thmaure)
  + [Azure Kubernetes Service (AKS)](https://azure.microsoft.com/en-us/services/kubernetes-service?WT.mc_id=thomasmaurer-blog-thmaure)
  + [Windows Virtual Desktop (WVD)](https://azure.microsoft.com/en-us/services/virtual-desktop?WT.mc_id=thomasmaurer-blog-thmaure)
* Describe as the benefits and usage of Virtual Networks, VPN Gateway, Virtual network peering, and Express Route
  + [Networking](https://azure.microsoft.com/en-us/product-categories/networking?WT.mc_id=thomasmaurer-blog-thmaure)
  + [Virtual Network](https://azure.microsoft.com/en-us/services/virtual-network?WT.mc_id=thomasmaurer-blog-thmaure)
  + [About Azure VPN gateway](https://docs.microsoft.com/en-us/azure/vpn-gateway/vpn-gateway-about-vpngateways?WT.mc_id=thomasmaurer-blog-thmaure)
  + [Virtual network peering](https://docs.microsoft.com/en-us/azure/virtual-network/virtual-network-peering-overview?WT.mc_id=thomasmaurer-blog-thmaure)
  + [Azure ExpressRoute](https://azure.microsoft.com/en-us/services/expressroute?WT.mc_id=thomasmaurer-blog-thmaure)
* Describe the benefits and usage of Container (Blob) Storage, Disk Storage, File Storage, and storage tiers
  + [Storage](https://azure.microsoft.com/en-us/services/storage?WT.mc_id=thomasmaurer-blog-thmaure)
  + [Blob Storage](https://azure.microsoft.com/en-us/services/storage/blobs?WT.mc_id=thomasmaurer-blog-thmaure)
  + [Disk](https://azure.microsoft.com/en-us/services/storage/disks?WT.mc_id=thomasmaurer-blog-thmaure)
  + [File](https://azure.microsoft.com/en-us/services/storage/files?WT.mc_id=thomasmaurer-blog-thmaure)
  + [Azure Blob storage: hot, cool, and archive access tiers](https://docs.microsoft.com/en-us/azure/storage/blobs/storage-blob-storage-tiers?WT.mc_id=thomasmaurer-blog-thmaure)
* Describe the benefits and usage of Cosmos DB, Azure SQL Database, Azure Database for MySQL, and Azure Database for PostgreSQL, and SQL Managed Instance
  + [Welcome to Azure Cosmos DB](https://docs.microsoft.com/en-us/azure/cosmos-db/introduction?WT.mc_id=thomasmaurer-blog-thmaure)
  + [Azure SQL Database](https://azure.microsoft.com/en-us/services/sql-database?WT.mc_id=thomasmaurer-blog-thmaure#product-overview)
  + [Azure Database for MySQL](https://azure.microsoft.com/en-us/services/mysql?WT.mc_id=thomasmaurer-blog-thmaure)
  + [Azure Database for PostgreSQL](https://azure.microsoft.com/en-us/services/postgresql?WT.mc_id=thomasmaurer-blog-thmaure)
  + [What is Azure SQL Managed Instance?](https://docs.microsoft.com/en-us/azure/azure-sql/managed-instance/sql-managed-instance-paas-overview?WT.mc_id=thomasmaurer-blog-thmaure)
* Describe the benefits and usage of Azure Marketplace
  + [Azure Marketplace](https://azuremarketplace.microsoft.com/en-us/marketplace?WT.mc_id=thomasmaurer-blog-thmaure)

### Objective: Describe Core Solutions and Management Tools on Azure (10-15%)

Describe core solutions available on Azure

* Describe the benefits and usage of IoT Hub, IoT Central, and Azure Sphere
  + [IoT Hub](https://docs.microsoft.com/en-us/azure/iot-hub/about-iot-hub?WT.mc_id=thomasmaurer-blog-thmaure)
  + [IoT Central](https://docs.microsoft.com/en-us/azure/iot-central/core/overview-iot-central?WT.mc_id=thomasmaurer-blog-thmaure)
  + [Azure Sphere](https://azure.microsoft.com/en-us/services/azure-sphere?WT.mc_id=thomasmaurer-blog-thmaure)
* Describe the benefits and usage of Azure Synapse Analytics, HDInsight, and Azure Databricks
  + [Azure Synapse Analytics](https://azure.microsoft.com/en-us/services/synapse-analytics?WT.mc_id=thomasmaurer-blog-thmaure)
  + [HDInsight](https://docs.microsoft.com/en-us/azure/hdinsight/hdinsight-overview?WT.mc_id=thomasmaurer-blog-thmaure)
  + [Azure Databricks](https://azure.microsoft.com/en-us/services/databricks?WT.mc_id=thomasmaurer-blog-thmaure)
* Describe the benefits and usage of Azure Machine Learning, Cognitive Services, and Azure Bot Service
  + [Azure Machine Learning](https://azure.microsoft.com/en-us/services/machine-learning?WT.mc_id=thomasmaurer-blog-thmaure)
  + [Cognitive Services](https://azure.microsoft.com/en-us/services/cognitive-services?WT.mc_id=thomasmaurer-blog-thmaure)
  + [Azure Bot Service](https://azure.microsoft.com/en-us/services/bot-service?WT.mc_id=thomasmaurer-blog-thmaure)
* Describe the benefits and usage of serverless computing solutions that include Azure Functions and Logic Apps
  + [Azure Functions](https://azure.microsoft.com/en-us/services/functions?WT.mc_id=thomasmaurer-blog-thmaure)
  + [Logic Apps](https://azure.microsoft.com/en-us/services/logic-apps?WT.mc_id=thomasmaurer-blog-thmaure)
* Describe solutions for software development including Azure DevOps, GitHub, GitHub Actions, and Azure DevTest Labs
  + [Azure DevOps](https://docs.microsoft.com/en-us/azure/devops/user-guide/what-is-azure-devops?WT.mc_id=thomasmaurer-blog-thmaure)
  + [GitHub](https://github.com/features)
  + [GitHub Actions](https://github.com/features/actions)
  + [Azure DevTest Labs](https://azure.microsoft.com/en-us/services/devtest-lab?WT.mc_id=thomasmaurer-blog-thmaure)

Describe Azure management tools

* Describe the functionality and usage of the Azure Portal, Azure PowerShell, Azure CLI, Cloud Shell, and Azure Mobile App
  + [Azure Portal](https://azure.microsoft.com/en-us/features/azure-portal?WT.mc_id=thomasmaurer-blog-thmaure)
  + [Azure PowerShell](https://docs.microsoft.com/en-us/powershell/azure/get-started-azureps?WT.mc_id=thomasmaurer-blog-thmaure)
  + [Azure PowerShell](https://www.thomasmaurer.ch/2016/05/how-to-install-the-azure-powershell-module/) (ThomasMaurer.ch)
  + [Azure CLI](https://docs.microsoft.com/en-us/cli/azure/get-started-with-azure-cli?WT.mc_id=thomasmaurer-blog-thmaure)
  + [Azure CLI](https://www.thomasmaurer.ch/2019/07/how-to-install-azure-cli-on-windows-one-liner/) (ThomasMaurer.ch)
  + [Cloud Shell](https://azure.microsoft.com/en-us/features/cloud-shell?WT.mc_id=thomasmaurer-blog-thmaure)
  + [Cloud Shell](https://www.thomasmaurer.ch/2019/01/azure-cloud-shell/) (ThomasMaurer.ch)
  + [Azure Mobile App](https://azure.microsoft.com/en-us/features/azure-portal/mobile-app?WT.mc_id=thomasmaurer-blog-thmaure)
* Describe the functionality and usage of Azure Advisor
  + [Azure Advisor](https://docs.microsoft.com/en-us/azure/advisor/advisor-overview?WT.mc_id=thomasmaurer-blog-thmaure)
* Describe the functionality and usage of Azure Resource Manager (ARM) templates
  + [What are ARM templates?](https://docs.microsoft.com/en-us/azure/azure-resource-manager/templates/overview?WT.mc_id=thomasmaurer-blog-thmaure)
* Describe the functionality and usage of Azure Monitor
  + [Azure Monitor](https://azure.microsoft.com/en-us/services/monitor?WT.mc_id=thomasmaurer-blog-thmaure)
* Describe the functionality and usage of Azure Service Health
  + [Azure Service Health](https://azure.microsoft.com/en-us/features/service-health?WT.mc_id=thomasmaurer-blog-thmaure)

### Objective: Describe General Security and Network Security Features (10-15%)

Describe Azure security features

* Describe basic features of Azure Security Center, including policy compliance, security alerts, secure score, and resource hygiene
  + [Azure Security Center](https://docs.microsoft.com/en-us/azure/security-center/security-center-intro?WT.mc_id=thomasmaurer-blog-thmaure)
* Describe the functionality and usage of Key Vault
  + [Key Vault](https://azure.microsoft.com/en-us/services/key-vault?WT.mc_id=thomasmaurer-blog-thmaure)
* Describe the functionality and usage of Azure Sentinel
  + [Azure Sentinel](https://azure.microsoft.com/en-us/services/azure-sentinel?WT.mc_id=thomasmaurer-blog-thmaure)
* Describe the functionality and usage of Azure Dedicated Hosts
  + [Azure Dedicated Hosts](https://docs.microsoft.com/en-us/azure/virtual-machines/dedicated-hosts?WT.mc_id=thomasmaurer-blog-thmaure)

Describe Azure network security

* Describe the concept of defense in depth
  + [Azure network security overview](https://docs.microsoft.com/en-us/azure/security/fundamentals/network-overview?WT.mc_id=thomasmaurer-blog-thmaure)
* Describe the functionality and usage of Network Security Groups (NSG)
  + [Network Security Groups (NSG)](https://docs.microsoft.com/en-us/azure/virtual-network/security-overview?WT.mc_id=thomasmaurer-blog-thmaure)
* Describe the functionality and usage of Azure Firewall
  + [Azure Firewall](https://azure.microsoft.com/en-us/services/azure-firewall?WT.mc_id=thomasmaurer-blog-thmaure)
* Describe the functionality and usage of Azure DDoS protection
  + [Azure DDoS Protection](https://azure.microsoft.com/en-us/services/ddos-protection?WT.mc_id=thomasmaurer-blog-thmaure)

### Objective: Describe Identity, Governance, Privacy, and Compliance Features (20-25%)

Describe core Azure identity services

* Explain the difference between authentication and authorization
  + [Windows Authentication Concepts](https://docs.microsoft.com/en-us/windows-server/security/windows-authentication/windows-authentication-concepts?WT.mc_id=thomasmaurer-blog-thmaure)
* Define Azure Active Directory
  + [Azure Active Directory](https://azure.microsoft.com/en-us/services/active-directory?WT.mc_id=thomasmaurer-blog-thmaure)
* Describe the functionality and usage of Conditional Access, Multi-Factor Authentication (MFA), and Single Sign-On (SSO)
  + [Conditional Access](https://docs.microsoft.com/en-us/azure/active-directory/conditional-access/overview?WT.mc_id=thomasmaurer-blog-thmaure)
  + [Multi-Factor Authentication (MFA)](https://docs.microsoft.com/en-us/azure/active-directory/authentication/concept-mfa-howitworks?WT.mc_id=thomasmaurer-blog-thmaure)
  + [What is single sign-on (SSO)?](https://docs.microsoft.com/en-us/azure/active-directory/manage-apps/what-is-single-sign-on?WT.mc_id=thomasmaurer-blog-thmaure)

Describe Azure governance features

* Describe the functionality and usage of Role-Based Access Control (RBAC)
  + [Role-Based Access Control (RBAC)](https://docs.microsoft.com/en-us/azure/role-based-access-control/overview?WT.mc_id=thomasmaurer-blog-thmaure)
* Describe the functionality and usage of Azure Policy
  + [Azure Policy](https://azure.microsoft.com/en-us/services/azure-policy?WT.mc_id=thomasmaurer-blog-thmaure)
  + [Azure Policy](https://www.thomasmaurer.ch/2020/03/keep-control-of-your-azure-environment-with-azure-policy/) ThomasMaurer.ch
* Describe the functionality and usage of resource locks
  + [resource locks](https://docs.microsoft.com/en-us/azure/azure-resource-manager/management/lock-resources?WT.mc_id=thomasmaurer-blog-thmaure)
  + [resource locks](https://www.thomasmaurer.ch/2020/02/prevent-azure-resources-from-unexpected-deletion-using-locks/) ThomasMaurer.ch
* Describe the functionality and usage of tags
  + [Azure tags](https://docs.microsoft.com/en-us/azure/azure-resource-manager/management/tag-resources?WT.mc_id=thomasmaurer-blog-thmaure)
  + [Azure Tags](https://www.thomasmaurer.ch/2020/02/use-azure-tags-to-organize-resources/) ThomasMaurer.ch
* Describe the functionality and usage of Azure Blueprints
  + [Azure Blueprints](https://docs.microsoft.com/en-us/azure/governance/blueprints/overview?WT.mc_id=thomasmaurer-blog-thmaure)
* Describe the Cloud Adoption Framework for Azure
  + [What is the Microsoft Cloud Adoption Framework for Azure?](https://docs.microsoft.com/en-us/azure/cloud-adoption-framework/overview?WT.mc_id=thomasmaurer-blog-thmaure)

Describe privacy and compliance resources

* Describe the Microsoft core tenets of Security, Privacy, and Compliance
  + [Introduction to Azure security](https://docs.microsoft.com/en-us/azure/security/fundamentals/overview?WT.mc_id=thomasmaurer-blog-thmaure)
  + [Strengthen your security posture with Azure](https://azure.microsoft.com/en-us/overview/security?WT.mc_id=thomasmaurer-blog-thmaure)
  + [Azure data privacy and protection](https://azure.microsoft.com/en-us/overview/trusted-cloud/privacy?WT.mc_id=thomasmaurer-blog-thmaure)
  + [Azure compliance](https://azure.microsoft.com/en-us/overview/trusted-cloud/compliance?WT.mc_id=thomasmaurer-blog-thmaure)
* Describe the purpose of the Microsoft Privacy Statement, Online Services Terms (OST) and Data Protection Amendment (DPA)
  + [Microsoft Privacy Statement](https://privacy.microsoft.com/en-us/privacystatement)
  + [Online Services Terms (OST)](https://www.microsoft.com/en-us/licensing/product-licensing/products)
  + [Privacy: It’s all about you](https://www.microsoft.com/en-us/trust-center/privacy)
* Describe the purpose of the Trust Center
  + [Microsoft Trust Center](https://www.microsoft.com/en-us/trust-center)
* Describe the purpose of the Azure compliance documentation
  + [Azure compliance documentation](https://docs.microsoft.com/en-us/azure/compliance?WT.mc_id=thomasmaurer-blog-thmaure)
* Describe the purpose of Azure Sovereign Regions (Azure Government cloud services and Azure China cloud services)
  + [National clouds](https://docs.microsoft.com/en-us/azure/active-directory/develop/authentication-national-cloud?WT.mc_id=thomasmaurer-blog-thmaure)
  + [Microsoft Azure operated by 21Vianet](https://docs.microsoft.com/en-us/azure/china/overview-operations?WT.mc_id=thomasmaurer-blog-thmaure)
  + [What is Azure Government?](https://docs.microsoft.com/en-us/azure/azure-government/documentation-government-welcome?WT.mc_id=thomasmaurer-blog-thmaure)

### Objective: Describe Azure cost management and Service Level Agreements (10-15%)

Describe methods for planning and managing costs

* Identify factors that can affect costs (resource types, services, locations, ingress and egress traffic)
  + [Azure pricing](https://azure.microsoft.com/en-us/pricing?WT.mc_id=thomasmaurer-blog-thmaure)
* Identify factors that can reduce costs (reserved instances, reserved capacity, hybrid use benefit, spot pricing)
  + [Tutorial: Optimize costs from recommendations](https://docs.microsoft.com/en-us/azure/cost-management-billing/costs/tutorial-acm-opt-recommendations?WT.mc_id=thomasmaurer-blog-thmaure)
  + [Save costs on Azure](https://www.thomasmaurer.ch/2020/01/how-to-reduce-the-costs-of-your-azure-iaas-vms/) (ThomasMaurer.ch)
* Describe the functionality and usage of the Pricing calculator and the Total Cost of Ownership (TCO) calculator
  + [Pricing calculator](https://azure.microsoft.com/en-us/pricing/calculator?WT.mc_id=thomasmaurer-blog-thmaure)
  + [TCO calculator](https://azure.microsoft.com/en-us/pricing/tco/calculator?WT.mc_id=thomasmaurer-blog-thmaure)
* Describe the functionality and usage of Azure Cost Management
  + [What is Azure Cost Management + Billing?](https://docs.microsoft.com/en-us/azure/cost-management-billing/cost-management-billing-overview?WT.mc_id=thomasmaurer-blog-thmaure)

Describe Azure Service Level Agreements (SLAs) and service lifecycles

* Describe the purpose of an Azure Service Level Agreement (SLA)
  + [Service Level Agreements](https://azure.microsoft.com/en-us/support/legal/sla?WT.mc_id=thomasmaurer-blog-thmaure)
  + [SLA summary for Azure services](https://azure.microsoft.com/en-us/support/legal/sla/summary?WT.mc_id=thomasmaurer-blog-thmaure)
* Identify actions that can impact an SLA (i.e. Availability Zones)
  + [Overview of the reliability pillar](https://docs.microsoft.com/en-us/azure/architecture/framework/resiliency/overview?WT.mc_id=thomasmaurer-blog-thmaure)
* Describe the service lifecycle in Azure (Public Preview and General Availability)
  + [Lifecycle FAQ – Microsoft Azure](https://docs.microsoft.com/en-us/lifecycle/faq/azure?WT.mc_id=thomasmaurer-blog-thmaure)
  + [Supplemental Terms of Use for Microsoft Azure Previews](https://azure.microsoft.com/en-us/support/legal/preview-supplemental-terms?WT.mc_id=thomasmaurer-blog-thmaure)