These include Azure services, Azure workloads, Azure security and privacy, and finally, Azure pricing and support. This course will help you to develop these skills, and prepare you to pass the official Azure AZ-900 exam

To get the most out of this course, it helps if you are familiar with the general technology concepts, including concepts of networking, storage, compute, application support, and application development.

You'll start off with:

* **AI services and solutions**. Here you will explore artificial intelligence and software development tools and services, from Microsoft Azure. You will be asked to help choose the best solutions for a given business scenario. To help you select the right tools and solutions, you'll also apply the criteria that experts use to make their choices.
* Next, you will work through **monitoring and managing in Azure.** You'll learn about monitoring and management tools and services from Microsoft Azure. You'll analyze decision criteria that experts use to select the right service for a specific scenario.
* As you dive deeper, you'll explore **Azure serverless technology, and Azure IoT solutions**. You'll be introduced to these tools and services and use expert criteria to choose the best solutions for different kinds of business, and technical needs and challenges.
* **General Security and Networking Security**, As things become even more exciting, you will find out how Azure can help you protect the workloads, that you run both in the cloud and in your on-premises datacenter. In this module, general security and network security, you will explore the Azure services you can use to help ensure that your network is safe, secure, and trusted.

Throughout this course, you will have an opportunity to get hands-on experience with Azure, through interactive exercises, practice quizzes, and practice exams. The interactive exercises offer opportunities to practice and implement what you are learning.

As an example, you'll need to configure network access to a virtual machine running on Azure. You'll work in a temporary Azure environment called the **sandbox.** The beauty about this, is that you will be working with real technology, but in a controlled environment, which allows you to apply what you learn, and at your own pace. As you explore the concepts and services that are available through Azure, you'll be given a case study, to apply what you're learning to real-world examples. In the case study, you'll assume the role of an IT specialist, and address the technology challenges of Tailwind Traders, so that you can help them conduct business more efficiently. Using real-world examples helps to reinforce concepts, prepare you for the exam, and gives you confidence in your approach. Now that you have a good idea of what you'll cover in this course, you can review what you learned throughout the modules in more detail. Good luck.

**Module 1 Description:**

In this module, you'll learn about Microsoft Azures AI and software development tools and services. You'll be introduced to these tools and services and will be asked to help choose the most suitable for a given business scenario. After completing this module, you will be able to:

* Choose the Azure AI services that best address your company's business challenges.
* Choose the software development process tools and services that best address specific business scenarios.

**Module 2 Description:**

In this module, you'll learn about the monitoring and management tools and services available from Microsoft Azure. You'll be introduced to these tools and services and will be asked to help choose the best one for different kinds of business and technical needs and challenges. After completing this module, you will be able to:

* Choose the cloud monitoring service that best addresses your company's business challenges.
* Choose the Azure management tools that best address your organization's technical needs and challenges.

**Module 3 Description:**

In this module, you will learn about Azure Serverless Technology and Azure IoT solutions. You'll be introduced to these tools and services and will be asked to help choose the best one for different kinds of business and technical needs and challenges. After completing this module, you will be able to: Choose the serverless computing technology that best addresses your business scenario. Choose the Azure IoT service that best addresses your business scenario.

**Module 4 Description:**

In this module, you'll learn about how Azure can help protect the workloads that you run in both the cloud and in your on-premises datacenter. You will also learn about the Azure services that keep your network is safe, secure, and trusted. After completing this module, you will be able to:

* Strengthen your security posture and protect against threats by using Azure Security Center.
* Explain how Azure Firewall enables you to control what traffic is allowed on the network.
* Configure network security groups to filter network traffic to and from Azure resources within a Microsoft Azure virtual network.
* Explain how Azure DDoS Protection helps protect your Azure resources from DDoS attacks.
* Collect and act on security data from many different sources by using Azure Sentinel.
* Store and access sensitive information such as passwords and encryption keys securely in Azure Key Vault.
* Manage dedicated physical servers to host your Azure VMs for Windows and Linux by using Azure Dedicated Host.
* Identify the layers that make up a defense in-depth strategy.

**By the end of this course, you’ll be able to:**

* Understand the benefits of taking the AZ-900 exam and becoming Microsoft Certified
* Choose the right serverless computing technology for your business scenario.
* Choose the correct Azure Artificial Intelligence service to address different kinds of business challenges.
* Choose the best software development process tools and services for a given business scenario.
* Choose the correct cloud monitoring service to address different kinds of business challenges.
* Choose the correct Azure management tool to address different kinds of technical needs and challenges.
* Choose the best Azure IoT service for a given business scenario.

**Microsoft Certifications for Developers:**

[~~Developer Certification Path~~](https://docs.microsoft.com/en-us/learn/certifications/roles/developer)~~:~~ [~~https://learn.microsoft.com/en-us/training/career-paths/developer~~](https://learn.microsoft.com/en-us/training/career-paths/developer)

**Microsoft Certifications for Administrator:**

[Administrator Certifications](https://docs.microsoft.com/en-us/learn/certifications/roles/administrator) : <https://learn.microsoft.com/en-us/training/career-paths/administrator>

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**Microsoft Certifications for DevOps Engineer:**

[~~https://docs.microsoft.com/en-us/learn/certifications/devops-engineer~~](https://docs.microsoft.com/en-us/learn/certifications/devops-engineer)

[~~https://learn.microsoft.com/en-us/credentials/certifications/devops-engineer/~~](https://learn.microsoft.com/en-us/credentials/certifications/devops-engineer/)

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AI SERVICES

**Artificial Intelligence is a category of computing that adapts and improves its decision-making ability over time**. Based on its successes and failures, Microsoft Azure provides several AI solutions to choose from, each one, depending on the problem you're trying to solve. Let's take a look at our case study to see what exciting challenges Tailwind Traders face. As you navigate this lesson, you'll need to be familiar with the following concepts:

* **API** or Application programming interfaces. Programmers use APIs to interact with the functionality that's contained in code libraries.
* Web API. An API that's accessible from servers that accept requests via http.
* Web API endpoint, the location of the code library, and
* Rest API, the design of the URL style that's used to expose the APIs functionality.

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Let's start off by exploring Artificial Intelligence**. AI is a broad classification of computing that allows a software system to perceive its environment and take actions that maximizes its chance of successfully achieving its goals. A goal of AI is to create a software system that's able to adapt or learn something on its own without being explicitly programmed to do it.** There are two basic approaches to AI.

* **Deep Learning (DL)**, The first is to employ a Deep Learning system that's modeled on the neural network of the human mind, enabling it to discover, learn, and grow through experience.
* **Machine Learning (ML),** The second approach is Machine Learning, a data science technique that uses existing data to train a model, test it, and then apply the model to new data to forecast future behaviors, outcomes, and trends.
  + *Forecasts or predictions* from Machine Learning can make apps and devices smarter. For example, when you buy online, Machine Learning powers product recommendation systems that offer additional products. These recommendations are based on your past purchases or products that you might be interested in.
  + *Fraud Detection,* Machine Learning is also used to detect credit-card fraud by analyzing each new transaction and using what it has learned from analyzing millions of fraudulent transactions.

At a high level, there are three primary product offerings from Microsoft, each of which is designed for a specific audience and use case. Each option provides a diverse set of tools, services, and programmatic APIs. In this lesson, we'll merely scratch the surface of the options capabilities.

1. **Azure Machine Learning,** First, Azure Machine Learning is a platform for making predictions. It consists of tools and services that allow you to connect to data, to train and test models, to find one that would most accurately predict a future result. After you've run experiments to test the model, you can deploy and use it in real time via a web API endpoint. With Azure Machine Learning, you can:
   1. Build a process that defines how to obtain data, how to handle missing or bad data, how to split the data into either a training session, or test set,
   2. Deliver the data to the training process.
   3. Train and evaluate predictive models by using tools and programming languages familiar to data scientists
   4. Create pipelines that define where and when to run the compute intensive experiments that are required to score algorithms based on the training and test data, and
   5. Deploy the best-performing algorithm as an API to an endpoint, so it can be consumed in real-time by other applications.

Choose Azure Machine Learning when your data scientists need complete control over the design and training of an algorithm using your own data. Second, **Azure Cognitive Services provide pre-built machine learning models that enable applications to see, hear, speak, understand, and even begin to reason**. Use Azure Cognitive Services to solve general problems, such as analyzing text for emotional sentiment, or analyzing images to recognize objects or faces. You don't need special machine learning or data science knowledge to use the services. Developers access Azure Cognitive Services via APIs and can easily include these features in just a few lines of code. While Azure Machine Learning requires you to bring your own data and train models over that data, Azure Cognitive Services, for the most part, provides pre-trained models so that you can bring in your live data to get predictions on. Azure Cognitive Services can be divided into the following categories: language services, allow your apps to process natural language with pre-built scripts, evaluate sentiment, and learn how to recognize what users want. Speech services, converts speech into text and text into natural sounding speech. Translate from one language to another and enables speaker verification and recognition. Vision services, add recognition and identification capabilities when you're analyzing pictures, videos, and other visual content. Decision services, add personalized recommendations for each user that automatically improve each time they're used. Moderate content to monitor and remove offensive or risky content and detect abnormalities in your time series data. Lastly, Azure Bot Service and Bot Framework are platforms for creating virtual agents that understand and reply to questions just like a human. Azure Bot Service is a bit different from Azure Machine Learning and Azure Cognitive Services, in that, it has a specific use case. Namely, it creates a virtual agent that can intelligently communicate with humans. Behind the scenes, the bot you build uses other Azure services, such as Azure Cognitive Services to understand what their human counterparts are asking for. Bots can be used to shift simple repetitive tasks such as taking dinner reservations or gathering profile information onto automated systems that might no longer require direct human intervention. Users converse with a bot by using text, interactive cards, and speech. A bot interaction can be a quick question and answer, or it can be as sophisticated conversation that intelligently provides access to services.

1. **Azure Cognitive Services**, Azure Cognitive Services is general purpose, meaning that many kinds of customers can benefit from the work that Microsoft has already done to train and test these models and offer them inexpensively at scale. Second, Azure Cognitive Services provide pre-built machine learning models that enable applications to see, hear, speak, understand, and even begin to reason. Use Azure Cognitive Services to solve general problems, such as analyzing text for emotional sentiment, or analyzing images to recognize objects or faces (**it comes to general purpose tasks such as performing speech to text, integrating with search or identifying the objects in an image)**

You don't need special machine learning or data science knowledge to use the services. Developers access Azure Cognitive Services via APIs and can easily include these features in just a few lines of code. While Azure Machine Learning requires you to bring your own data and train models over that data, **Azure Cognitive Services, for the most part, provides pre-trained models** so that you can bring in your live data to get predictions on.

Azure Cognitive Services can be divided into the following categories.

1. Language services, allow your apps to process natural language with pre-built scripts, evaluate sentiment, and learn how to recognize what users want.
2. Speech services, converts speech into text and text into natural sounding speech. Translate from one language to another and enables speaker verification and recognition.
3. Vision services, add recognition and identification capabilities when you're analyzing pictures, videos, and other visual content.
4. Decision services, add personalized recommendations for each user that automatically improve each time they're used. Moderate content to monitor and remove offensive or risky content and detect abnormalities in your time series data.
5. Azure Bot Service and Bot Framework are platforms for creating virtual agents that understand and reply to questions just like a human. *Azure Bot Service is a bit different from Azure Machine Learning and Azure Cognitive Services, in that, it has a specific use case.*Namely, **it creates a virtual agent that can intelligently communicate with humans**. Behind the scenes, the bot you build uses other Azure services, such as Azure Cognitive Services to understand what their human counterparts are asking for. **Bots can be used to shift simple repetitive tasks** such as *taking dinner reservations* or *gathering profile information onto automated systems that might no longer require direct human intervention*. Users converse with a bot by using text, interactive cards, and speech. A bot interaction can be a quick question and answer, or it can be as sophisticated conversation that intelligently provides access to services.

In this session, you'll analyze the criteria that expert’s employee when they choose an AI service for a specific business need. Understanding the criteria can also help you better understand the nuance differences among the products.

1. **Azure Bot Services,** the first criteria you should consider when building a virtual agent is, are you building one that interfaces with humans via natural language? **If the answer is yes, you use an Azure Bot Service to create your virtual agent**.

Bot Service integrates knowledge services. Natural language processing and form factors to allow interactions across different channels. Bot Service solutions usually rely on other AI services for such things as natural language understanding or even translation for localizing replies into a customer's preferred language. There are also prebuilt no code solutions that cover common scenarios and depending on the requirements, may make more sense than starting off by building a custom chat experience with Bot Service. For example, you can use QnA Maker, which is available from Azure Marketplace to build, train and publish a sophisticated Bot that uses FAQ pages support websites, product manuals, SharePoint documents or editorial content through an easy-to-use UI or via REST APIs.

Likewise, Power Virtual Agents integrates with Microsoft Power Platform so that you can use hundreds of prebuilt connectors for data input. A connector is a proxy or a wrapper around an API that allows the underlying service to talk to Microsoft Power Automate, Microsoft Power aps and Azure Logic aps. It provides a way for users to connect their accounts and leverage a set of prebuilt actions and triggers to build their aps and workflows. You can extend power virtual agents by building custom workflows with Power Automate. And if you feel that the out of the box experience is too limiting,you can still build more complex interactions with Microsoft Bar Framework.

1. **Azure Cognitive Services**, Next, you need to consider if the service you are building needs to understand the content and meaning of images, video or audio are that can translate text into a different language**. If it does, you should use Azure Cognitive Services, this is the best solution when it comes to general purpose tasks such as performing speech to text, integrating with search or identifying the objects in an image**. Azure Cognitive Services is general purpose, meaning that many kinds of customers can benefit from the work that Microsoft has already done to train and test these models, and offer them inexpensively at scale.
2. **Azure Cognitive Services Personalizer (for usage patterns and predict behavior)**, if you need to predict user behavior or provide users with personalized recommendations in your app, you should use Azure Cognitive Services Personalizer. Azure Cognitive Services Personalizer watches your users’ actions within an application. You can use Personalizer to predict their behavior and provide relevant experiences as it identifies usage patterns. Here again, you could capture and store user behavior and create your own custom Azure Machine Learning solution to do these things. But this approach would require much effort and expense.
3. **Azure Machine Learning,** If you are developing an app that needs to predict future outcomes based on private historical data, you use Azure Machine Learning. For example, suppose you need to analyze years’ worth of financial transactions to discover new patterns that could help you create new products and services for your company's clients and then offer those new services during routine customer service calls. When you're working with proprietary data, you're likely need to build a more custom-tailored machine learning model. If you need to build a model by using your own data or perform a different task than those that have already been discussed, you can use Azure Machine Learning for maximum flexibility. Data scientists and AI engineers can use the tools they're familiar with on the data you provide to develop deep learning and machine learning models that are tuned for your requirements.

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The Tailwind Traders e-commerce websites allow its customers to browse and purchase items that can be delivered or picked up from a retail store nearest to their location. The marketing team is convinced that it can increase sales dramatically by suggesting add-on products that complement the items in the shopper's cart at the point of checkout. The team could hard code these suggestions, but it feels that a more organic approach would be to use its years’ worth of sales data, as well as new shopping trends to decide what products to display to the shopper. Additionally, the suggestions could be influenced by product availability, product profitability, and other factors. The marketing teams, existing data science experts, have already done some initial analysis of the problem domain, and have determined that it's plan might take months to prototype and possibly a year to rule out.

Let's apply the decision criteria you learned about in the previous session to find the right option for Tailwind Traders.

Is Tailwind Traders Building a virtual agent that interfaces with humans via natural language? *No, it is not. So Azure bot service is not a good candidate for this scenario. Does Tailwind Traders need a service that can understand the content and meaning of images, video, audio, or translate text into a different language? No, it doesn't. The relevant cognitive services will not help the company. Does Tailwind Traders need to predict user behavior or provide users with personalized recommendations? Yes, it does.* However, creation recommendations based on user behavior is only part of the requirement. Tailwind Traders needs to create a complex model that incorporates historical sales data, trending sales data, inventory and more. It's possible that the Azure cognitive services personalizer could play a role, but it couldn't handle the entire breath of the project alone.

Will the Tailwind Traders app predict future outcomes based on private historical data? Yes, and that is why in this scenario, Azure Machine Learning is likely the best choice. The success of this effort would depend primarily on the ability of the model to precisely select the right up sale products to suggest to the shopper. Because the model would need to be tweaked and tuned over time, an off the shelf model would likely not suffice. In this case study, the marketing team already employs some Data Science Experts, and the team is willing to make at least a year long commitment to building, testing and tweaking the models to be used.

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The first generation of the Tailwind Traders eCommerce Website was available exclusively in English. However, when the marketing team sponsored a demographic study for the company's brick and mortar locations, it found that on average only 80% of the potential customers speak English. In some neighborhoods, that number falls to 50%. The team sees the addition of multiple languages as a wonderful opportunity to serve non-English speakers, with the same online eCommerce experience, as English speakers. As in the previous session, let's apply the decision criteria you learned about earlier to find the right option. Tailwind Traders will not be implementing a virtual agent at the moment; however, the team are excited about adding multiple languages to serve non-English speakers

*Translator is part of Azure Cognitive Services,* it is easy to integrate into your applications, websites, tools and solutions. It allows you to add multi language user experiences, in more than 60 languages, and you can use it on any hardware platform with any operating system for text-to-text language translation. It is likely the best solution for Tailwind Traders, but let's continue applying the decision criteria to make sure.

Based on the case study, Tailwind Traders do not need to predict user behavior or provide users with personalized recommendations. So Azure Cognitive Services Personalizer, is not a good candidate for their current goals. Based on the case study, although it's possible to create a machine learning model for multi-language translation, it would be expensive and time consuming for Tailwind Traders to attempt to build translation models themselves. The team has neither the deep learning competency, nor the linguistic data that's required to train the models. Now that you've examined all the expert criteria, you can confidently select Azure Cognitive Services as the best product option for this case study.

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The customer service team has long asked for a virtual agent to handle most questions it gets asked. No matter how prominent it makes the answers to the most frequently asked questions (FAQ) on the website, shoppers are impatient and perceive contact in a check window as saving them time. The team wants shoppers to feel as though they're interacting with a real human. When it becomes clear that the virtual agent can't provide an answer, the chat session should be transferred to a human. Providing a virtual agent would decrease the amount of time it takes for all shoppers to receive answers. *The virtual agent could answer most questions which would free up human customer service agents to provide support for more difficult questions or thorny account related* issues. Once again, apply the decision criteria you're now familiar with to find the right product.

1. Are tailwind traders building a virtual agent that interfaces with humans via natural language? Yes, it is. Azure bot service should be used in this scenario to implement a virtual agent chat experience. Bot service could benefit from the information on the websites frequently asked questions page. Along with thousands of chat sessions that had been stored between shoppers and customer service representatives.

Customer service supervisors can test and tweak the answers to continue to refine the chat experience. Even though you've likely found the best option for this scenario, keep applying the decision criteria to see whether any additional options might work.

1. Does tailwind traders need a service that can understand the content and meaning of images, video, audio, or translate text into a different language? Possibly yes. In this scenario, Azure cognitive of services could be used along with bot service to build the solution. To expedite implementation, the developers could explore using prebuild solutions such as Q&A maker part of cognitive services are power virtual agents. Also any Azure bot solution would likely implement several Azure cognitive services, such as language understanding, lewis and possibly translator to translate from the Sharper's language to English and back again.
2. Does tailwind traders need to predict user behavior or provide users with personalized recommendations? No it doesn't. Azure cognitive services personalizer is not a good candidate for this scenario.
3. Will the tailwind traders app need to predict future outcomes based on private historical data? No. Although tailwind traders does have historical data to feed into a model, which would make it possible to use Azure machine learning to create a chat solution, another option is already tailored for the chat bar experience.

Our goal in this lesson was to help tailwind traders explore several AI service offerings from Azure that it can apply to various business opportunities. *Without AI services tailwind traders would spend more time and effort on manual tasks, respond to customers less quickly, offer week product recommendations. And be unable to fully support customers who speak languages other than English*. AI is one focus that could transform every area of a business. Such transformation is limited only by the creativity and imagination of the organization.

TASK :

1. Machine learning, which is a data science technique uses existing data to train and test a model, then apply that model to new data to forecast future behaviors, outcomes, and trends.
2. Azure Cognitive Services includes vision services that allow recognition and identification capabilities when analyzing pictures, videos, and other visual content.
3. Azure Cognitive Services includes speech services that can convert speech into text and text into natural-sounding speech. It can translate one language into another and enable speaker verification and recognition.
4. The Azure Bot Service and Bot Framework is a platform for creating virtual agents that understand and reply to questions just like a human.
5. Azure Machine Learning is a platform for making predictions. It consists of tools and services that allow you to connect to data to train and test models to accurately predict a future result.
6. Azure Cognitive Services provides pre-built machine learning models that enable applications to see, hear, speak, understand, and even begin to reason.
7. Azure Cognitive Services provides pre-built machine learning models that enable applications to see, hear, speak, understand, and even begin to reason.
8. The Azure Bot Service and Bot Framework is a platform for creating virtual agents that understand and reply to questions just like a human.

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SOFTWARE DEVELOPMENT PROCESS TOOLS & SERVICES

This week you'll explore software development process tools and services. Modern software development practices are supported by tools that encompass virtually every aspect of the software development lifecycle. In this lesson, you will focus specifically on the comprehensive set of tools that Microsoft has created to help organizations implement DevOps practices, develop solutions, and save money while doing so.

During this lesson, you'll notice that sometimes it seems as though these tools overlap in functionality. To help you select the right tools and solutions, you'll explore the criteria that experts use to make their choices. There are no formal prerequisites for this course. However, some familiarity with the concept of DevOps and it's larger purpose in an organization is valuable.

Microsoft offers tools to enable Source Code Management, automating the creation of testing environments and continuous integration and continuous delivery. To help with understanding the value of the tools covered in this lesson, it is beneficial to have familiarity with the concepts such as :

* Software development lifecycle,
* Source Code Management, and version control.
* The various forms of testing,
* CI (continuous integration) and CD (continuous delivery),
* Continuous deployment,
* Infrastructure as code

Software developers and operations professionals strived to create working software systems that satisfy the needs of the organization. However, sometimes they're short-term objectives are across purposes which can result in technical issues, delays, and downtime.

**DevOps is a new approach that helps to align technical teams as they work towards common goals**. To accomplish this alignment, organizations employ practices and processes that seek to automate the ongoing development, maintenance, and deployment of software systems. Their aim is to expedite the release of software changes, ensure the ongoing deploy ability of the system, and ensure that all changes must high-quality bar.

A diagram of software development

Description automatically generatedWhen done correctly. DevOps practices and processes touched nearly every aspect of the company. This includes the software development lifecycle and the collaboration of software developers with each other and with operations and quality assurance teams (QA teams). DevOps requires a fundamental mindset change from the top-down. Organizations can't merely install software tools or adopt services and hope to get all of the benefits promised by DevOps. Now let's check in with tailwind traders to see if the organization has any plans to adopt a DevOps mindset. Tailwind traders has experimented with various software development processes and tools until now, However, there has been no organizational commitment to shift to a DevOps mindset. Likewise, there has been no planned coordinated effort to standardize on a set of core tools and processes. Several new initiatives at the company. Essentially with the need for agile, repeatable, dependable management, and deployment of software systems. Tailwind traders believes that the adoption of DevOps tooling and practices is critical to the company's future success.

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you'll be introduced to three primary offerings, and Each offering is aimed at a specific audience and use case and provides a diverse set of tools, services, programmatic APIs, and more. Let's dive right in.

1. Azure DevOps Services,

**Azure DevOps Services is a suite of services that address every stage of the software development life cycle**.  Azure DevOps is a mature tool with a large feature set that began as on-premises server software and evolved into a **software as a service (SaaS)** offering from Microsoft

1. **Azure boards** is an agile project management suite that includes Kanban boards, reporting and tracking ideas, and work from high-level epics to work items and issues. Like Kanban boards, it visually displays work at various stages of a process.
2. **Azure Repos** is a centralized source code repository where software development, DevOps, Engineering, and documentation professionals can publish their code for review and collaboration.
3. **Azure Pipelines** is a continuous integration and continuous delivery pipeline automation tool.
4. **Azure test plans** is an automated test tool that can be used in a CI/CD pipeline to ensure quality before a software release.
5. **Azure Artifacts** is a repository for hosting artifacts such as compiled source code, which can be fed into testing or Deployment Pipeline steps.
6. GitHub and GitHub Actions

GitHub is arguably the world's most popular code repository for open-source software. Git is a decentralized source code management tool and GitHub is a hosted version of Git that serves as the primary remote. GitHub builds on top of Git to provide related services for coordinating work, reporting and discussing issues, providing documentation, and more. It offers the following functionality.

1. **Shared source code**, It's a shared source code repository including tools that enable developers to perform code reviews by adding comments and questions in web view of the source code before it can be merged into the main codebase.
2. **Project management,** It facilitates project management including Kanban boards.
3. **Tracking,** It supports issue reporting, discussion, and tracking.
4. **Automation,** It features CI/CD pipeline automation tooling.
5. **Collaborative,** It includes a wiki for collaborative documentation,
6. **Cloud or on Premises,** and it can be run from the cloud or on-premises.

Most relevant for this module, GitHub Actions enables workflow automation with triggers for many lifecycle events. One such example would be automating a continuous integration or continuous delivery (CI/CD) toolchain.

A diagram of a software development process

Description automatically generated A toolchain is a combination of software tools that aid in the delivery, development, and management of software applications throughout a systems development lifecycle. *The output of one tool in the toolchain is the input of the next tool in the toolchain*. Typical tool functions range from performing automated dependency updates to building and configuring the software, delivering the build artifacts to various locations, testing, and so on.

With such similarity between many GitHub and Azure DevOps features, you might wonder which product to choose for your organization. Unfortunately, the answer might not be straightforward. Although both Azure DevOps and GitHub allow public and private cold repositories, GitHub has a long history with public repositories and is trusted by tens of thousands of open-source project owners.

*GitHub is a lighter-weight tool than Azure DevOps* with the focus on individual developers contributing to the open-source code. *Azure DevOps, on the other hand, is more focused on enterprise development with heavier project management and planning tools and fine-grained access control.*

It's important for you to note that your choices are not limited to Azure DevOps Services or GitHub and GitHub actions. In practice, you can mix and match these services as needed. For example, you can use GitHub Repos with Azure boards for work item tracking.

1. Azure DevTest Labs (SetUp, Shutdown, Test, Control costs).

Finally, let's take a brief look at Azure DevTest labs and how it helps organizations to manage the VMs that developers and testers need to ensure a new app works across various operating systems.

**Azure DevTest Labs provides an automated means of managing the process of building, setting up, and tearing down virtual machines that contain bills of your software projects**. This way, developers and testers can perform tests across a variety of environments and bills, and this capability isn't limited to VMs. Anything you can deploy in Azure VM, Azure Resource Manager template can be provisioned through DevTest Labs. Provisioning pre-created lab environments with their required configurations and tools already installed is a huge time-saver for quality assurance professionals and developers.

**So** How does Azure DevTest Labs work? Suppose you need to test a new feature on an old version of an operating system. Azure DevTest Labs can set up everything automatically upon request. After the testing is complete, DevTest Labs can shut down and deep vision the VM which saves money when it's not in use. To control costs, the management team can restrict how many labs can be created, how long they run, and so on.

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In this session, you'll analyze the criteria that experts employ when they choose DevOps tools or services to address specific business needs. Understanding the criteria can also help you better understand the nuanced differences between each product.

If your aim is to automate the creation and management of a test-lab environment, consider choosing Azure DevTest Labs. Among the three tools and services we've discussed, it's the only one that offers this functionality. However, you can automate the provisioning of new labs as part of a tool chain by using Azure pipelines or GitHub actions. You should also consider if you are building open-source software, although Azure DevOps can publish public quarter repositories, GitHub has long been the preferred host for open-source software.

If you're building open source software, you would likely choose GitHub. If for no other reasons, then it's visibility in general acceptance by the open-source development community. Your choices aren't limited to Azure DevOps services, or GitHub and GitHub actions. In practice, you can mix and match these services as needed, for example*, you can use GitHub Repos with Azure boards for work item tracking*. However, the remaining decision criteria you will look at in this lesson are specific to choosing between either Azure DevOps or GitHub.

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Regarding Source Code Management and DevOps tools, you need to think about what level of granularity you need for permissions. *GitHub works on a simple model of read-write permissions to every feature*. Meanwhile, Azure DevOps, has a much more granular set of permissions that allow organizations to refine who was able to perform most operations across the entire toolset.

When it comes to Source Code Management and DevOps tools, you need to consider how sophisticated your project management and reporting needs to be. Although, GitHub has work items, issues, and a Kanban board**, project management and reporting is the area where Azure DevOps excels**. Azure DevOps is highly customizable, which allows an administrator to add custom fields to capture metadata and other information alongside each work item. By contrast, *the GitHub issues feature uses tags as its primary means* of helping a team categorized issues. When it comes to Source Code Management and DevOps tools, you need to think about how tightly you need to integrate with third party tools. Although we make no specific recommendations about third party tools, it's important for you to understand your organization's existing investments in tools and services. To evaluate how these dependencies might affect your choice. It's likely that most vendors that create DevOps tools, create hooks are APIs that can be used by both Azure Pipelines and GitHub actions. Even, it's probably worth the effort to validate that assumption.

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In this video, you'll apply the decision criteria that you have already examined to choose the most appropriate services. Let's check in with Tailwind Traders to see what the software development team are busy with.

The software development team at Tailwind Traders, works on many different projects both for internal and external usage. The team needs to give project sponsors and managers executive level reporting. This reporting includes burned down charts, track progress against epics and track custom information. That's specific to Tailwind Traders in each work item and bug report. As Tailwind Traders grows and hires contractors and outside vendors for short term work. The upper management team wants to ensure that these individuals have access only to the information they need to do their work. Let's apply the decision criteria to help Tailwind Traders choose the best DevOps solution, for each scenario.

* 1. Does Tailwind Traders need to automate and manage test lab creation? No, in this scenario, as your Dev Test Labs is not a candidate because it isn't intended for this specific use case.
  2. Is Tailwind Traders building open-source software? No, although it's not stated specifically, Tailwind Traders is building internal and external systems such as their e-commerce system, which isn't open source. So that isn't a consideration in this scenario.
  3. Given the level of granularity the Tailwind Traders team needs for assigning permissions. Is Azure DevOps a good candidate for this scenario? Yes, earlier we stated that Tailwind Traders will hire temporary employees and vendors for short term work. This would make a granular permissions requirement an important consideration for upper management.

Based on what we have covered earlier, this feature would make Azure DevOps a leading candidate. By using Azure DevOps Tailwind Traders, administrators would also have a more robust set of options for controlling permissions across the entire portfolio of work.

* 1. Does Tailwind Traders require a sophisticated project management and reporting solution? Yes, in the Tailwind Traders case study, robust project management and reporting features are one of the primary considerations. Here again because of the amount of work eyes in customization and reporting the management team wants; Azure DevOps would likely be a good choice.
  2. Does Tailwind Traders require tight integration with any third party DevOps tools? No,, tool integration was not listed as a primary consideration for this scenario. As you learned in the previous session, most third-party DevOps tools integrate both Azure DevOps and GitHub. Which makes it likely that the team will find the tools it needs. Considering all the expert criteria in this case, there is no doubt that Azure DevOps is the service we should choose.

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Tailwind Traders hopes to publish an API that would allow third parties to integrate their own inventories of new and used items. This approach would allow Tailwind Traders to offer a wider variety of products directly from their e-commerce site. Although the internal implementation of the API is closed source, Tailwind Traders wants to create a set of examples that call the API to perform various actions. The team needs a platform to share example code, collect feedback on the API, allow contributors to report issues and build a community around feature requests.

Using our case study, let's continue to apply the decision criteria you learned about previously to help Tailwind Traders find the right option.

1. Does Tailwind Traders need to automate and manage test lab creation? No, In this scenario, Azure DevTest labs is not a candidate because it isn't intended for this specific use case.
2. Is Tailwind Traders building open-source software? Yes, As we noted in a previous session, developers are used to seeing this content available on GitHub. With GitHub, Tailwind Traders developers can publish their code except community contributions to improve the code examples, accept feedback and bug reports and more. Because this scenario involves Open-Source Code, GitHub is a leading candidate.
3. Given the level of granularity, the Tailwind Traders team needs for assigning permissions, is GitHub a good candidate for this scenario? Yes, although it's not stated explicitly, the fact that Tailwind Traders will be accepting community contributions, issuing reports, and generally attempting to build a community of developers around their API examples, the company's permission needs are basic. Users can either view only or view and write.
4. Does Tailwind Traders require a sophisticated project management and reporting solution? No,.Because of the nature of this project, the team doesn't require a sophisticated project management and reporting solution. In this scenario, the strength of the Azure DevOps Services isn't required.
5. Does Tailwind Traders require tight integration with any third-party DevOps tools? No, Tune integration wasn't listed as a primary consideration for this scenario. However, this doesn't qualify or disqualify either tool. GitHub is the best choice for this scenario. Although you could use Azure DevOps to make the repository public, some of the other features that involve the development community, such as feedback or bug reports, would be less accessible.

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Tailwind traders want to be more methodical and careful when it pushes new versions of its e-commerce website to production. The company will expand its quality assurance team (QA team), and it will use the cloud to create and host virtual machines. Through this approach, it will create testing environments that match the production environment.

The management team has concerns around the costs of a more automated test environment, For instance, it wants to make sure that the QA professionals are not wasting time configuring the testing environment to match the production environment. The team wants to ensure that the VMs are destroyed when they're no longer in use. It wants to limit the number of VMs that each QA Professional is allowed to spin up. Also, the team wants to ensure that each environment is configured correctly and consistent with the production environment.

Once again, start by applying the decision criteria you learned about in the previous session to help Tailwind Traders solve this final scenario,

1. does Tailwind Traders need to automate and manage tests lab creation? Yes,. This looks like a job for Azure DevTest Labs because it can do everything that the team needs to accomplish in this scenario. We could continue evaluating the decision criteria, but neither Azure DevOps nor GitHub is needed for this scenario. Remember that either Azure DevOps or GitHub could be used to create product releases that can automatically be included in any VMs that you create for testing purposes.

Without software development services and tools from Microsoft, the Tailwind Traders team might have difficulty in realizing the benefits of such DevOps practices as continuous integration and continuous delivery, Source Code Management, and work ISO management.

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1. Azure DevOps is a suite of services that address every stage of the Software Development Lifecycle (SDL).
2. GitHub is one of the most popular code repositories for open-source software. GitHub provides related services for coordinating work, reporting, and discussing issues, providing documentation, and more.
3. GitHub has a long and trusted history with public repositories and is trusted by tens of thousands of open-source projects. GitHub is “lighter weight” than Azure DevOps, with a focus on individual developers contributing to open source. Azure DevOps, on the other hand, is more focused on enterprise development with heavier project management and planning tools, and finer-grained access control.
4. Azure DevTest Labs allows for the provisioning of pre-created lab environments with required configurations and tools already installed. It is a huge timesaver for quality assurance professionals and developers.
5. Azure DevTest Labs is suitable for automating and managing test lab creation.
6. Azure DevOps has a much more granular set of permissions that allow organizations to refine who is able to perform most operations across the entire toolset. Also, Azure DevOps is highly customizable, allowing an administrator to add custom fields to capture metadata and other information alongside each work item. By contrast, GitHub Issues uses tags as its primary means of helping a team categorize issues
7. With GitHub, your company can publish its code, accept community contributions to improve the code examples, accept feedback, and bug reports. Because this scenario involves open-source code, GitHub is a leading candidate.
8. Machine learning, which is a data science technique uses existing data to train and test a model, then apply that model to new data to forecast future behaviors, outcomes, and trends.
9. Speech services is a feature of Azure Cognitive Services that allow the conversion of speech into text and text into natural-sounding speech.
10. Vision services provides the ability to add recognition and identification capabilities when analyzing pictures, videos, and other visual content.
11. Azure Cognitive Services provides pre-built machine learning models that enable applications to see, hear, speak, understand, and even begin to reason.
12. Azure DevTest Labs provides an automated means of managing the process of building, setting up, and tearing down Virtual Machines.
13. Given the nature of this project, requires a sophisticated project management and reporting solution which Azure DevOps is ideal for.

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