PL-900 Microsoft Power Platform Fundamentals
From 29 September, 2022

Describe the business value of Power Platform services

Please note: not all items are included in these notes. Please see the videos for details.

Describe the business value of Power Platform services

1. Analyze data by using Power BI

- Business Intelligence service
- Create insights using data visualizations
- Create reports and dashboards
- Upload to the Cloud
- Use this analysis to create informed decisions
- Either FREE or US$10 a month (a more expensive version is available).
- Scalable across a company.
- Use case:
    - Analyse data taken from Power Apps, or added in a flow from Power Automate.

2. Act with Power Apps

- Build custom web and mobile apps.
- Run these apps on most devices.
- Simple interface allowing everyone to use.
    - No-code/low-code platform.
    - Use familiar formulas such as SUM and TEXT.
- Use cases:
    - Build an app with inventory details.
    - Check out equipment with Self-service support,
    - Pick up equipment,
    - Access instructions for equipment,
    - Report problems.

4. Create flows by using Power Automate

- Previously known as Microsoft Flow, workflows are the go-between with apps and services.
- Automate processes:
    - Emails,
    - Collect data,
    - Streamline the approval process.
- Save time (and money) in automating repetitive processes.
- Simple interface allowing everyone to use.
- Use case:
    - Send reminders based on loan.

5. Use connectors to access services and data

- Connect apps, data and cloud devices together.
- Connect from:
    - Table data – SQL Server, SharePoint, Common Data Service

- Function-based data – Azure Blob storage, Project Online, Office 365 Users – to return data <u>and</u> do actions (send emails, update permissions, create calendar events).
- More than 200 connectors.
- Choose connectors in AppSource.

6. Create powerful chatbots by using a guided, no-code graphical interface
- Reduced effort to create chatbots.
- Integrates with other parts of Power Platform.
- Can perform actions using Power Automate.
- Use existing Power Automate flows, or create them in Power Virtual Agents.

Describe the business value of extending business solutions by using Power Platform

7. Describe how Dynamics 365 apps can accelerate delivery of Power Platform business solutions
- The Dynamics 365 apps include:
    - Dynamics 365 Sales,
    - Dynamics 365 Customer Service,
    - Dynamics 365 Field Service,
    - Dynamics 365 Marketing, and
    - Dynamics 365 Project Service Automation.
- They use the Dataverse to store data.
- You can therefore use Power Platform against data stored in Dynamics 365 Apps using the Dataverse connector.
    - The Dynamics 365 connector is now deprecated.
- To connect to the following Dynamics 365 apps, use the relevant connector:
    - Dynamics 365 Business Central,
    - Dynamics 365 Customer Insights, and
    - Dynamics 365 Finance and Operations (aka Fin & Ops) – Dynamics 365 Finance and Dynamics 365 Supply Chain Management.
- To test against something occurring in Dynamics 365, you can use the trigger "When a Business Event occurs".

8. Describe how Power Platform business solutions can be used by Microsoft 365 apps including Microsoft Teams
- Connect to <u>files</u> using the following connectors:
    - Excel,
    - Text/CSV,
    - XML, JSON, PDF,
    - Folder, Parquet,
    - SharePoint folder (connect to <u>files</u>).
- Connect to databases using:
    - SQL Server database,

Describe the business value of extending business solutions by using Power Platform

- Access database,
- SQL Server Analysis Services database (and more).
- Connect to Online services using:
    - SharePoint Online list (connect to lists),
    - Microsoft Exchange Online,
    - Dynamics 365 Online,
- Connect to Other using:
    - SharePoint list,
    - Microsoft Exchange

10. Describe how Power Platform business solutions can consume Microsoft Azure services

- Connect to Azure services:
    - Azure SQL database,
    - Azure Synapse Analytics (SQL DW),
    - Azure Analysis Services database,
    - Azure Database for PostgreSQL,
    - Azure Blob Storage,
    - Azure Table Storage,
    - Azure Cosmos DB,
    - Azure Data Lake Storage Gen2,
    - Aszure HDInsight,
    - Azure Databricks.

11. Describe how Power Platform business solutions can consume third-party apps and services

- Connect to databases:
    - Oracle database,
    - IBM Db2/Informix/Netezza,
    - MySQL database,
    - PostgreSQL database,
    - Sybase database,
    - Teradata database

11a. Describe use cases for AppSource

- AppSource can be found at https://appsource.microsoft.com
    - You can also click the "Get more visuals" in the Visualizations section in Power BI.
- AppSource includes apps that integrate into Microsoft 365, Dynamics 365, Power BI, Power Apps and Power Platform services. It includes:
    - Apps – you can view by category, industry or product.
        - For Power Platform, the products are Power Apps, Automate, BI apps, BI visuals and Virtual Agents.
        - You can purchase apps immediately, get a demo or free trial, or ask the publisher to contact you so you can get the app directly.

- Consulting Services – services which provide assessments, briefings, implementations, proofs of concept, and workshops
- Industry Clouds for Financial Services, Healthcare, Non-profit & Intergovernmental Organizations (IGO), and Retail
- Partners – products and services in your area.
- Use cases therefore include:
  - New Power BI visualizations,
  - Integrations with Word, Excel, PowerPoint, OneNote, SharePoint and Outlook,
  - Web apps.
- You can use them for categories including:
  - AI + Machine Learning, Finance, IT & Management Tools, Productivity and Project Management.

11b. Describe how Microsoft Power Platform apps work together
- Microsoft Dataverse is a data store which can be used by Power Apps, Power Automate and Power BI.
  - It is the only data store that can be used by model-driven Power Apps.
- You can embed canvas apps on a form in a model-driven app.
- You can integrate Power BI visualizations into canvas and model-driven Power Apps.
- You can integrate AI Builder content in canvas Power Apps and Power Automate.
  - You can also integrate some AI Builder content in model-driven Power Apps.
- You can call Power Automate flows from Power Apps and Power Virtual Agents.
- Power Automate flows can call Power Automate Desktop flows.
- In Microsoft Teams, you can add canvas and model-driven Power Apps, Power Virtual Agents bots, and Power BI visualizations.

Describe Power Platform administration and security

12. Describe how Power Platform implements security including awareness of Common Data Service security roles, Azure Identity Services
- Microsoft statement:
  - Microsoft is committed to the highest levels of trust, transparency, standards conformance, and regulatory compliance. Microsoft's broad suite of cloud products and services are all built from the ground up to address the most rigorous security and privacy demands of our customers.
- Security role
  - A collection of privileges allows you to do things.
  - Roles can be assigned to users or teams.
  - All users must be assigned to at least one security role.
- Power Apps (Dataverse) security roles:
  - Environment Admin – All administrative actions, including:
    - Add/remove users from Environment Admin/Maker roles,
    - Provision Dataverse database,
    - Manage all resources,

Describe Power Platform administration and security

- Set data loss prevention policies.
- Environment Maker – Create new resources in an environment, including apps and connections, gateways and flows. This does not include accessing data in an environment.
- System Administrator – Full permission, including viewing data.
- System Customizer – Full permission, but only viewing data in tables they create.
- Microsoft Basic User – Run apps, create/write/delete records that they own.
- Delegate – Act on behalf of another user.
- Authentication (AuthN) – who are you?
  - Uses Azure Active Directory (Azure AD or AAD).
  - Can also use Multi-factor Authentication (MFA) with Azure AD.
- Authorization (AuthZ) – what do you have access to?
  - Uses Role-Based Access Control (RBAC).
- Role assignments are added in the Access Control (IAM) page, and consist of:
  - Security Principal – who (or what object) are you?
  - Scope - what do you want access to?
  - Role definition (also known as "role") – how much access.

13. Describe how to manage apps and users

- Apps can be managed by going to Power Apps - Apps.
  - You can manage who uses them by going to Share.
- Users that can access an environment can be managed by going to
  - Settings
  - Power Platform Admin Center
  - selecting the environment
  - Settings
  - Users + permissions – Users
  - And by clicking on the appropriate user.
  - It will then open in Dynamics 365.

14. Describe environments

- Environments allow you to store, manage, and share within the Power Platform:
  - Data,
  - Apps, and
  - Flows.
- Each environment allows one Common Data Service (CDS) database.
- An environment is created:
  - In an Azure Active Directory (Azure AD) tenant.
  - Bound to a geographic location, as is the CDS database.
  - By going to Power Platform Admin Center – Environments.
- Multiple environment can be used for:
  - Different geographic locations.
  - Development/testing/production. There are five types of environments:
    - Default

Describe Power Platform administration and security

- Environment created automatically.
- Cannot be deleted, backed-up, or restored.
- No users will be automatically added to Environment Admin role.
- All licensed users will be automatically added to the Environment Maker role.
- Limited to 32 Gb of storage capacity.
- Production
  - For permanent work. Need 1GB available database capacity.
- Sandbox.
  - Development and testing.
  - Allows for "copy" and "reset".
- Trial.
  - Short-term (expire after 30 days), for 1 user.
- Developer
  - Community Plan license – cannot be shared.
- Microsoft Dataverse for Teams.
  - Automatically created in Teams.

15. Describe where to perform specific administrative tasks including Power Platform Admin center, Microsoft 365 admin center
- Power Platform Admin Center is a combination of:
  - Power Apps Admin Portal,
  - Power Automate Admin Portal,
  - Business Platform Admin Portal, and
  - Dynamics 365 Admin Center
- It allows you to administer:
  - Environments
    - which instances of Common Data Service you have,
    - Open an environment to view/edit user's personal data (which takes you into Dynamics 365 Settings).
  - Analytics
    - Dataverse
      - Home: Active users, total operations, most active users performing operations.
      - Active users,
      - Mode of access,
      - Entity usage.
    - Power Automate
      - Usage,
      - Location,
      - Errors,
      - Service Performance,
      - Connectors reports
    - Power Apps

Describe Power Platform administration and security

- Runs – by day, week and month
- Usage – different types of flows in use
- Created – when created
- Errors
- Shared
- Connectors
- Resources
  - Capacity, Dynamics 365 apps, and Portals.
- Data integration (add and monitor pre-defined connections using the CDS).
- Data policies (which data connectors can be used with the CDS – can limit flow of data),
- Tenant (monitor licenses and quotas).
- Go to Power Platform – Admin center – and use the options on the left-hand side.
  - Or go to https://admin.powerplatform.microsoft.com
- Microsoft 365 Admin Center allows you to administer:
  - Users (and License assignment),
  - Groups,
  - Resources,
  - Billing,
  - Support, and
  - Settings
- Go to https://admin.microsoft.com

16. Describe Data Loss Prevention (DLP) policies
- DLP policies help prevent company data from being accidentally made public.
  - You need Tenant Admin or Environment Admin roles to create DLP policies.
  - It restricts access to connectors.
- Can be scoped at:
  - Environment level, or
  - Tenant level, and then:
    - All environments,
    - All environments except for…, or
    - Some environments,
- Connectors can be classified:
  - Business,
  - Non-business (Personal-use; the default),
  - Blocked (stop connector being used in scope). The following cannot be "Blocked":
    - Power Platform connectors
      - Dataverse,
      - Approvals,
      - Notifications,
    - Microsoft 365 Enterprise License connectors
      - Excel Online (Business),
      - Microsoft Teams, Groups, Outlook, Users,

Describe Power Platform administration and security

- OneDrive for Business
- Power BI
- SharePoint.
- DLP policies will prevent
    - a Business connector
        - as defined in one policy
    - connecting to a Non-business connector
        - as defined in the same policy.
- Suggest using as few conflicting policies as possible.

17. Describe how the platform supports privacy and accessibility guidelines
- Data Protected
    - Data in transmit is secured.
- TLS 1.2 or higher is used to access server endpoints.
    - Transport Layer Security provides enhanced security from server to browser.
    - API access is protected in the same way.
- Power Platform supports GDPR
    - More details: https://www.microsoft.com/TrustCenter/Privacy/gdpr/default.aspx
- You can use the Accessibility Checker to finding issues in Power Apps:
    - Missing labels/captions/control settings.
    - Whether HTML is accessible, or focus is not showing.
    - More details: https://docs.microsoft.com/en-us/powerapps/maker/canvas-apps/accessibility-checker

17a. Describe Microsoft Power Platform privacy and accessibility capabilities
- The Microsoft Trust Center gives links to information on privacy.
    - Only give users that which they need.
        - No access to other data.
    - However, allow users to share records.
    - Data between user devices and Microsoft datacenters are secured using Transport Layer Security (TLS).
    - Data at rest uses Transparent Data Encryption (TDE) – encryption at rest.
    - There are tools available to comply with the EU's General Data Protection Regulation (GDPR).
    - Your data is uploaded to a default geographical location.
        - Data can move to other regions with the location for replication purposes, but will not move outside this general geographical location.
- As for accessibility:
    - The Power Platform works with Windows, which has got many accessibility features.
    - Canvas Power Apps have many features to allow accessibility, such as:
        - Layout and color themes are accessible.
        - Works with keyboard navigation and screen readers.

Describe Power Platform administration and security

- Videos can be captioned, with the transcript available to the end user.
- Model-driven Power Apps can also use a screen reader and keyboard shortcuts.
- Power BI allows for Keyboard navigation, Screen-reader compatibility, High contrast colors view, Focus mode and Show data table

17b. Describe Microsoft Power Platform governance capabilities
- Governance aims to allow you to solve business problems effectively while complying with IT and compliance.
- Environments allow you to have your data in separate silos.
  - You can select from Production (full), Sandbox (for developing and testing with low risk) and Trial (30 days only)
- Use existing user and group management solutions.
  - Power Apps and Power Automate do not provide additional access to data.
  - Access is controlled with Environment roles, Power Platform resource permissions, and Dataverse security roles.
  - Data Loss Prevention policies (DLP) can stop Business connectors from being connected to non-Business connectors.
  - Conditional Access Policy can allow or block access based on user, group, device and/or location.
  - Data can be audited, and you can ensure that it is compliant.
- Licensing
  - Can be used in conjunction with Microsoft 365 and/or Dynamics 365.

17c. Describe analytics and how they can be used
- Analytics data can be found by going to Power Platform admin center – Analytics.
  - You need admin rights to view it.
- You can change the environment and the date range (from last 28 days to last 14 or last 7 days) by clicking "Change filters".
  - For Power Automate and Power Apps, you can also click on the filter in the top-right hand corner.
  - For Power Automate and Power Apps, just like in Power BI, you can click on a visualization and then the … in the top-right hand corner, and export the data, show as a table, or re-sort the axis.
- The Dataverse reports shows:
  - Active Users,
  - API (Application Programming Interface) Calls and Pass Rate
  - The number of plug-ins which have been executed.
  - The total number of operations (create, update, delete and read) which have happened.
  - The most active users performing operations, and
  - The top 10 most failing plug-ins.
- There are also Dataverse report tabs for:
  - Active users,
  - Mode of access,

- Entity (Table) usage,
- System jobs,
- Plug-ins,
- API calls statistics, and
- Mailbox usage.
- The Power Automate reports shows:
  - Runs – The number of daily, weekly and monthly runs,
  - Usage – the different types of flows which are being used,
  - Created – cloud flows created,
  - Errors – recurring error types and details,
  - Shared – The flows shared, and
  - Connectors – total calls and runs from each flow per connector
- The Power Apps reports are:
  - Usage report – app launches across device platforms and player versions, together with daily active users, for all apps.
  - Location report – map-based view, together with app launches by country.
  - Toast Errors report – toast error count, distribution and trend.
    - Toast is a small pop-up notification that shows certain events without requiring the user to react immediately.
  - Service Performance report – best and least performing services, time taken for service response, service connections with server error, and successful connection requests to the services. You can also filter by service/connector.
  - Connectors report – app connectors and connector details. You can filter by connector type.

Describe the Dataverse (Common Data Service)

What is the Dataverse/Common Data Service (CDS)?
- Common Data Model was an open data model standard.
  - It was published in the "Open Data Initiative", an industry-wide initiative.
- In November 2020, it was renamed to become Microsoft Dataverse, and some terminology was changed as well.
- Easy to manage
- Easy to secure
- Access Dynamics 365 Data
- Rich metadata
- Logic and validation
- Productivity tools
- Every environment has:
  - A specific geographic location, and
  - A maximum of one Microsoft Dataverse database (optional)

Describe the Dataverse (Common Data Service)

Old name	New name
Entity	Table
Field/attribute	Column
Record	Row
Option set/multi select option set/ Picklist	Choice
Two Options	Yes/No

18a. describe the difference between databases and Dataverse
- Similarities between databases and Dataverse
    - A database contains tables, which contains a specific set of data.
        - such as Accounts, Contacts, Email, Phone Calls.
    - It uses rows to store a particular item of data.
        - such as an Account, a Contact, an Email, a Phone Call.
    - It uses columns to store details about the data.
        - such as ID, Description, Name and Time of call.
- The Dataverse allows for the following:
    - Easy to manage – it is stored in the cloud and is managed by Microsoft.
    - Easy to secure – users will only see data to which you grant them access.
    - Used by both Power Apps and Dynamics 365.
        - Can also be read by Power Automate and Power BI.
    - Data types and relationships are used directly in Power Apps.
    - Allows for:
        - calculated columns (for aggregating items),
        - business rules (for logic),
        - workflows (automated actions), and
        - business process flows (stages and steps for entering data).
    - Productivity tools – you can use add-ins with Microsoft Excel.
- The Dataverse also incorporates the Common Data Model.
    - A series of standard tables for use with Dataverse and Dynamics 365, where appropriate.

18b. Describe the differences between Dataverse and Dataverse for Teams
- Dataverse for Teams environment is separate to the standard Dataverse.
    - It is a single environment for up to 10,000 teams where you can add data, apps, chatbots and workflows.
        - Dataverse allows for multiple environments, subject to capacity.
- Dataverse for Teams has a capacity of 2Gb - around 1 million rows.
    - If you need more, you can upgrade to Dataverse, which has a capacity of 4 Tb or more.
- Dataverse allows for activity logging, auditing, field-level security and record sharing.

- Dataverse for Teams does not.
- Dataverse for Teams can integrate with Power Automate.
  - Dataverse can also integrate with Azure Synapse Link for Dataverse, Events to Azure Event Hubs and Azure Service Bus, and SSMS
- Dataverse for Teams is only licensed for Teams.
  - Dataverse is also licensed for Power Apps, portals, Dynamics 365 and custom code.

19. Describe entities, fields, and relationships
- An entity is a logical set of records used to store data.
  - Contains records and fields, or rows and columns.
  - Akin to tables in a relational database.
  - Can store millions of items, and can be extended to 4 Terabytes per instance.
  - In November 2020, Microsoft Dataverse now uses "table" instead of entities.
- There are four types of entities:
  - Standard – base set of entities created in the CDS.
    - Fields can be added, but not deleted.
  - Custom – a "blank" table.
  - Complex – contains server-side business logic. May contain workflow and plug-ins.
    - Requires Dynamics 365 license.
  - Restricted – stores data not normally used outside of Dynamics 365, or maintains data in a specific way.
    - Requires Dynamics 365 license.
- Dataverse allows for two types of ownership of entities:
  - Organization owned. Access level is at the user level.
  - User or Team owned (Teams are owned by a Business Unit). Access level is at the:
    - Organization level,
    - Business Unit level,
    - Business Unit and Child Business Unit level, or
    - User's own records only.
- This happens when the Entity is created. It cannot be later changed.
- Security is cumulative across the Dataverse database environment.
- Fields:
  - A discrete piece of information about a record.
  - Similar to columns, with data of a specific data type.
  - Number of fields in an entity is variable – can be over a hundred, if necessary.
  - In November 2020, Microsoft Dataverse now uses "columns" instead of "fields".
- Relationships are links between entities:
  - Typically one-to-many and many-to-many.
  - One-to-many relationships are also called parent-child relationships, with zero, one or many on the "many" side.
  - Usually using a Primary or unique key on the one side.

Describe the Dataverse (Common Data Service)

20. Describe solutions and their purpose
- Used to transport apps and components from one environment to another.
    - Contains site maps, tables, processes, web resources, flows and more.
- Unmanaged solutions
    - Used in development environments.
    - There are two default unmanaged solutions:
        - Common Data Service Default Solution. This is the solution which is used for any customisations by default.
        - Default Solution. All components in the system. It cannot be Exported.
    - If an unmanaged solution is deleted, it is only the container which is deleted. All unmanaged customizations then belong to the default solution.
- Managed solutions
    - Used to deploy to other (non-development) environment – test, User Acceptance Testing (UAT), system integration testing (SIT) and production.
    - Managed ("controlled" in other programs) solutions should be generated by exporting an unmanaged solution as managed.
        - Components cannot be directly edited within a managed solution.
        - Managed solutions cannot be exported – only deleted. When deleted, all components as well as the solution will be deleted.

21. Describe business logic uses including business rules, real-time workflows, and actions
- Business rules allow you to apply business logic at the data layer (not the app layer).
    - They can therefore be used in Power Apps, Power Automate, or API.
- They can, for both canvas and model-driven apps:
    - Validate stored data,
    - Set/clear field values,
    - Show error messages for invalid data.
- Model-driven apps only can also:
    - Show/hide/enable/disable fields,
    - Create business recommendations based on BI.
- Business rules have:
    - Condition – the trigger; should the "true" or "false" side of the business rule be run?
    - Action – logic in the true or false side.
    - Scope (for model-driven forms) – Entity, all model-driven forms, or specific form
        - The scope for canvas apps is always "Entity".
- To create a business rule, go to Data – Entities, and then Business Rules.
    - Business rules run whenever a relevant field's value is changed.
- Real-time workflows:
    - Go to Power Apps – Settings (wheel) – Advanced settings – Settings – Processes
        - or go to Solutions – [Name of Solution] - New
    - Use when you want to immediately see the results.

- Power Automate Automated flows work asynchronously.
- Real-time workflows are attached to a table, and start:
    - after a Row is created,
    - Before or after a Row status changes,
    - Before or after a Row is assigned,
    - Before or after Row fields change
    - Before a Row is deleted.
- Actions:
    - Custom process actions (or Custom actions or Actions for short) are similar to real-time processes, but they are called when code (such as a real-time process) calls them.
    - The action creates a "message", shows that the action starts. This "message" can be linked to external code (called a "plug-in") which can then be automatically run.
        - Messages allow for input and output variables.
        - This means you can pass data to the "message" data, and once the plug-in has run, you can retrieve data from the "message".
    - Unlike real-time processes, actions do not need to be attached to a table.

22. Describe dataflows and their uses
- Dataflows allow you to:
    - Load data from various sources, such as databases and text files
        - There are over 80 data sources.
        - You can also use the results of other data flows as the source.
        - If you need to connect to an on premises source, then you may need a data gateway.
    - Transform it using Power Query (also used in Excel and Power BI),
        - This includes combining from multiple data sources into one query
    - Save it online into the Dataverse, the Power BI Service, or Azure Data Lake Storage.
        - You can then access this saved data in the Power Platform (Power BI, Power Apps, Power Automate, Power Virtual Agents and Microsoft Dynamics 365).
- You can run this in Power Apps, Power Automate, Power BI Service (Pro or Premium) and more.
    - To run this in Power Apps or Power Automate, go to Dataverse – Dataflows.
    - To run this in Power BI, go to a workspace other than "My workspace", and go to "+ New" – Dataflow.
- You design the process, and it runs in the cloud.
    - The results can be refreshed (automatically/manually), based on any updated data.

Describe Connectors

24. Describe triggers including trigger types and where triggers are used
- Triggers start a Power Automate flow:
    - Time-based – start at midday,
    - Action-based – email or new data received.
- Only used in Power Automate.

25. Describe actions
- Used in Power Automate and Power Apps.
- An action between data and function.
    - Send email.
    - Add a new record/row.

26. Describe licensing options for connectors including standard or premium tier
- More than 275 connectors, some of which are Standard:
    - Twitter,
    - Dropbox,
    - Google Sheets,
    - Office 365,
    - Salesforce,
    - YouTube,
    - SharePoint,
    - Microsoft Azure
- Premium tier connectors require additional licensing:
    - MailChimp,
    - SurveyMonkey,
    - SQL Server.

27. Identify use cases for custom connectors
- Power Platform has more than 200 connectors.
- Custom connectors can extend connections by calling an API.
    - API = Application Programming Interface.
    - They can be publicly available, or you can create one.
    - They allow functions to be available for developers.
    - Azure Active Directory is recommended as the authentication model for your APIs and connectors.
- Can be used in different platforms:
    - Power Apps,
    - Power Automate/Azure Logic Apps.
- You can share your custom connector:
    - With others in your organization, and
    - With the public, but only if it is Microsoft certified. Certification is free to apply.

Describe AI Builder

28. Identify the business value of AI Builder
- AI Builder allows you to use Artificial Intelligence in Power Apps.
- Uses Azure Machine Learning and Cognitive services.
- No need to write code or create Machine Learning models.
- Without the AI Builder, the above would require a high level of computer skills.

29. Describe models including business card reader, detection model, form processing model, and prediction model
- Form processing model
  - Extracts text from images.
    - Works on JPG, PNG and unprotected PDF files.
    - Text-embedded PDFs as best.
  - To do this:
    - Fields - Enter names of fields, clicking + to add them.
    - Tables – Enter names of tables and columns to be extracted.
    - Create collections – groups of at least 5 documents with the same layout.
    - Analyze – AI Builder detects fields and tables.
    - Tag – Tab fields and tables (and tag the columns)
    - Train the model.
- Business card reader uses the form processing model
  - Reads an uploaded photo/picture.
  - If a business card, extracts required information.
  - No configuration required.
- Prediction model
  - Will something happen, based on past history data?
    - Binary prediction – Yes/No
    - Multiple outcome prediction – more than 2 outcomes.
    - Numerical prediction
  - To do this:
    - Entity – select the table that contains the data and outcome you want to predict.
    - Field – select the column that contains the outcome.
  - After training, AI Builder gives a grade A (best) to D (something is wrong).
- Object detection model
  - Identifies objects from uploaded images
  - Counts number of objects included.
  - To do this:
    - Select the domain, which is the use model:
      - Objects on retail shelves (products densely packed)
      - Brand logo (logo detection)
      - Common objects (anything else)
    - Provide object names

Describe AI Builder

- Up to 500 per model.
- Enter in AI Builder or select names from Dataverse.
  - Upload images
    - From local storage, SharePoint, or Azure Blob storage
  - Tag images
    - Tag at least 15 images per object name
- Text Category Classification
  - Categorises text by meaning.
  - Select text – select the table and column where text is stored.
  - Select tags – Select column where tags are stored.
  - Select language
  - Select Train my AI.
  - Can be used for:
    - Sentiment analysis – positive, negative, neutral or mixed,
    - Spam detection,
    - Customer request routing.
- Prebuilt models:
  - Key phrase Extraction model
  - Language detection model
  - Text recognition model
    - OCR printed and handwritten text from images
  - Text translational model

30. Describe how the Power Apps and Power Automate can consume AI Builder data

		Power Apps Canvas	Power App Model-driven	Power Automate
Business Card Reader	Pre-built	Yes	Yes	Yes
Category classification	Pre-built and custom			Yes
Entity extraction	Pre-built and custom			Yes
Key phrase extraction	Pre-built			Yes
Language detection	Pre-built			Yes
Receipt processing	Pre-built	Yes		Yes
Sentiment analysis	Pre-built			Yes
Text recognition	Pre-built	Yes		Yes
Text translation	Pre-built			Yes
Form processor	Custom	Yes		Yes
Object detector	Custom	Yes		Yes
Prediction model	Custom			Yes

Identify common Power BI components

31. Identify and describe uses for visualization controls including pie, bar, donut, and scatter plots and KPIs

- Bar/column charts – standard chart for looking at values across categories.
- Line chart – measures over (usually) time.
- Area charts – a filled version of line charts
- Cards – showing specific measures.
- Pie/donut charts – show a part as a proportion of the whole.
- Treemaps – colored rectangles, showing a part as a proportion of the whole.
- Gauge charts – current value, together with min, max and goal.
- KPIs – progress across time, and compared to a goal
- Maps – spatial data with measures.
- Matrix/table – Measures shown as numbers – matrix is akin to PivotTables.
- Scatter plots – two numbers plotted against each other, with an optional third measure for size (bubble plot).
- Waterfall charts – running totals (and change) against (usually) time.
- Key influencers – understand what drives measures
- Decomposition tree – drill down into measures

Identify common Power BI components

33. Describe the Power BI Desktop Reports, Data, and Model tabs

- Report view
  - Allows you to add visualizations using fields from data sets.
  - Can also apply filters.
  - Can contain several different pages.
  - The standard view.
- Data view
  - Allows you to see data contained in your report.
- Model view
  - Visually set relationships between queries.

36. Compare and contrast Power BI Desktop and Power BI Service

Power BI Desktop	Power BI Service
When creating a new report, can connect to lots of different data sources, including Access, Azure, Dataverse, Dynamics 365, Excel, Files, Folders, HDFS, Python, R, and SQL Server.	When creating a new report, can connect to data in an Excel spreadsheet, csv files, Power BI Desktop Files, OneDrive, SharePoint, and previously shared or used datasets.
Can use the above data sources when refreshing reports.	Can refresh using most data sources, but not Hadoop File (HDFS). Some types (such as on-premises databases) may require gateways.
Can create reports, including creating visualizations, and creating cross-report drill through reports.	Can create reports, including creating visualizations, and creating cross-report drill through reports.
Can Get and Transform data, and develop models, including calculated columns and measures.	No.
No.	Can create dashboards. A Pro license or Premium capacity is needed for workspaces or apps (for sharing).
No.	Can access using Power BI Mobile App
Cannot share (unless you give them the file).	Can create workspaces, and can share workspaces and apps.
Can change some security settings.	Can change some security settings.

36b. Describe using Power BI in mobile apps

- Power BI can be used in mobile apps for Apple, Android and Windows devices.
    - You can view your analyses on a mobile app, even if there is no internet access.
        - Content will update in the background every 2 hours over wifi, and every 24 over the phone network.
    - There are tabs for Quick Access, Metrics hub and Activity feed.
    - In the main display there are Frequents, Recents and Recommended.
    - At the bottom there are icons for Home, Favorites, Apps and Workspaces.
        - If you click on the Workspaces icon, you can choose a Workspace (such as your personal "My Workspace"), and then click on (for example) a dashboard.
        - There are icons at the bottom and the top-right:
            - Comments,
            - Q&A
                - You can enter words to generate a new visualization, or look at featured insights.
            - invite,
            - Siri,
            - Expand,
            - … (More), and
            - Back.
        - You can tap a chart to open it in focus mode.
        - Once in focus mode, there are 4 icons:
            - comment,
            - open report
                - This opens the report which the chart has come from
            - annotate
                - You can annotate using text, lines and icons. There are also icons to erase and undo.
            - share.
    - There is also a … More button, which includes Recents, Shared with me, Explore and Notifications.
    - There is a profile picture in the top-left hand corner, which includes Accounts and Settings.
    - In the top-right hand corner there are Search and Scanner icons.

Power BI: Connect to and consume data

38. Clean and transform data

- Get and Transform/Power Query Editor:
    - Home gives often used functions.
    - Transform/Add Column allows you to:
        - Change Data Type
        - Replace Values

Power BI: Connect to and consume data

- Pivot/Unpivot.
- Split, Format or Extract Text.
- Standard Number and Date & Time Functions.
- Add Column also allows you to add custom columns using the M language and columns from examples.
- Check the quality of the data in View – Data Preview
    - Column quality – % of Error and Empty cells (question) – all columns.
    - Column distribution – numbers of distinct and unique (non-distinct) values – all columns.
    - Column profile – Both (in numbers, not %), plus Min and Max. (plenty) – one column
- In the Report and Data sections of Power BI, you can also create:
    - Calculated columns – an answer for every row,
    - Calculated measures – a numerical/date answer calculated in visualizations, using the DAX language.

39. Describe and implement aggregate functions
- Measures are usually numerical values (sometimes dates or datetime values) which can be summarised.
- Grouping together data to provide summarised results:
    - Sum
    - Average (Mode) and Median
    - Minimum and Maximum
    - Count (Not Blanks) and Count (Distinct)
    - Standard deviation and Variance
- Combining values is technically known as "aggregating".
- Text and date data can be Counted, and you can use the First and Last aggregations.

40. Identify available types of data sources including Microsoft Excel
- It's easier to ask what doesn't connect.
- In Power BI Server, the following can use a live/DirectQuery link (the others cannot):
    - SQL Server Database,
    - SQL Server Analysis Services,
    - Azure SQL Database, and
    - Azure SQL Data Warehouse.
- The above and the following can have a scheduled refresh:
    - Databases:
        - Access Database,
        - IDM DB2 Database,
        - MySQL Database,
        - ODBC and OLE DB,
        - Oracle Database,
        - PostgreSQL Database,
        - SAP HANA Database,
        - Sybase Database,

Power BI: Connect to and consume data

- Local files (need a gateway):
    - Excel,
    - Folder,
    - JSON,
    - Text/CSV,
    - XML
- Active Directory,
- Azure Blob and Table Storage,
- Odata Feed,
- SAP Business Warehouse server,
- SharePoint Folder and List (on-premises),
- Teradata, and
- Web.

41. Describe use cases for shared datasets and template apps and how to consume each
- Shared Datasets
    - Used to have consistent data within an organization.
    - Cannot share datasets from classic workspaces, only using the new workspace experience.
    - Experts can also promote or certify datasets to be used.
- Template Apps
    - Build Power BI Apps with no-code/low-code.
    - Available in the Power BI Apps marketplace and Microsoft AppSource.
        - Microsoft AppSource is a place for apps, add-ins and extensions.
        - https://appsource.microsoft.com/marketplace/apps?product=power-bi-visuals

41b. Describe options for viewing Power BI reports and dashboards
- You can view reports and dashboards:
    - From Power BI Service
        - One that you have created.
        - One that you have shared with you directly.
            - You may see them in Home – Favorites and Recents, or in Shared With Me.
        - One that is included in an app.
    - From a website.
        - Where it has been previously put onto a website.
- You can also view reports:
    - From Power BI Desktop.
        - Either one you have created, or a file that you have been sent.
    - By clicking on a tile in a dashboard.
- You would need a Power BI Pro or Premium license for some of these ways.

Build a basic dashboard using Power BI

42. Design a Power BI dashboard
- You "pin" "tiles" from a report into a Power BI dashboard.
- These tiles cannot be filtered.
- Clicking on them gets you into the report that they came from.
- You can also "pin" a live page.
    - Live pages, as they are just taken from a report, can be filtered.

44. Publish and share reports and dashboards
- You can get alerts from dashboards when a specific threshold target is met.
- You can comment in dashboards.
- Restrict sharing in the Tenant options.

Identify common Power Apps components

45. Describe differences between canvas apps and model-driven apps

Canvas apps	Model-driven apps
You choose the screen size	The screen is responsive
You can design "pixel perfect" screens.	Responsive design means that objects may be resized.
Layout first.	Dataverse Data first.
User interface can be simple or complex.	User interface is more simple
Business processes more simple.	Business processes can be more complex

48. Describe use cases for formulas
- Formulas are used when you need to add additional functionality:
    - Retrieve information,
    - Modify the format of controls,
    - Perform calculations,
    - Modify the property of other controls,
    - Conditional formatting,
    - Validate data.
- Formulas include:
    - Text – Left, Right, Mid, Len
    - Logical – If, And, Not, Or, IsError
    - Action – SetProperty
    - DateTime – Year, Month, DateAdd, DateDiff
    - Math – Sum, Min, Round, trigonometry

Build a basic canvas app

50. Connect to data by using connectors
- Connection to <u>on-premises</u> databases requires an on-premises Data Gateway to be installed.
    - This includes SQL Server and Oracle databases.
    - Allows you to connect to (among others) Power BI, Power Apps, Power Automate, Azure Analysis Services, and Azure Logic Apps

52. Use controls to design the user experience
- Controls are User Interface elements that creates an action or show information.
- Text
    - Labels,
    - Text/pen Input,
    - HTML text, and
    - Rich text editor.
- Input
    - Buttons,
    - Text/pen input,
    - Drop down/Combo box/List box,
    - Date picker,
    - Check box/Radio/Toggle
    - Slider, Rating, Container, Timer.
- Forms
    - Details about your data; create and edit records
- Media
    - Image, Camera, Barcode scanner, Video, Audio, Add picture.
- Charts
    - Column, Line and Pie charts, and Power BI Tile
- Icons
- Galleries
    - Layout containers that hold a set of controls that show records from a data source.
- These are available in the Insert menu.

53. Describe embedding into Microsoft Teams
- Embed as a tab app
    - In Microsoft Teams, go to a channel in a team (e.g. the "General" channel).
    - Click + to add an app.
    - Choose Power Apps.
    - Choose an existing app that has been shared (or a sample app).
    - To open it in Teams, just click on the tab.
- Embed as a personal app
    - Go to Power Apps – App.
    - Click on the ... next to the App, and select "Add to Teams".

- If wanted, add any description (click "Edit details") or other details (click "Advanced settings").
- Click "Download app".
- In Microsoft Teams - Apps, click on "Manage your apps" and then "Upload a custom app".
- Click "Add" for a personal app or "Add to team" as a tab.

54. Publish and share an app
- First, save your App:
    - File – Save as – The Cloud – Save
- Then Share:
    - Who do you want to share it with?
        - Users, and
        - Security Groups.
    - What permissions should they have?
        - User is the default: View and use, but not change.
        - Co-owner: Use, edit, share, but not delete or change owner
    - You can also "Send an email invitation to new users".
    - Users and contributors need permissions to any data connections.
- If you need to go back to a previous version:
    - Go to Apps – click on the Icon for the App – and click on Restore.
    - A new version will then to be added to your list, which you can then Publish.

Build a basic model-driven app

59. Add entities to app navigation
- Site map designer
- Unlike canvas apps:
    - The user interface is simple, but
    - The business processes can be more complex.

60a and 60b. Modify forms and views
- You can embed canvas apps and Power BI reports into your form.

61. Publish and share an app
- Go to Share.
- Choose a security role
- Choose user.
- Select role.
- Click Share.
- They can use the Web URL to get direct access.

Identify common Power Automate components

62. Identify flow types
- There are three basic flow types:
- Event driven flows
    - Build a trigger, and then some actions.
    - Called "My flow" (one owner) and "Team flows" (multiple owners).
    - These are divided into:
        - Automated flows – triggered by an event: new email, Twitter posts, request for leave (approval flows).
        - Scheduled flows – repeat every X minutes/hours/days/weeks
        - Instant flows – start with a tap of a button
- Business process flows
    - Used with Model-driven Apps and the Dataverse.
    - Define up to 30 stages, each with individual steps, to get to a desired outcome.
- Desktop flow
    - Robotic Process Automation (RPA)
    - Record yourself performing actions in your desktop or on the web.
    - Trigger a flow to repeat that action.
    - Data can be passed in or out of the process as well, automating more manual processes.

63. Describe use cases for and available templates
- Use cases:
    - Automation of repetitive tasks, including desktop-based processes.
        - Moving data from one system to another
    - A process for users to follow
    - Connecting to external data sources, with over 200 connectors, such as
        - SharePoint,
        - Office 365 Outlook,
        - OneDrive,
        - Twitter,
        - DropBox
        - Microsoft Dataverse,
        - Salesforce,
        - Dynamics 365,
        - Google Drive
- Top picks templates include:
    - Save Office 365 email attachments to OneDrive for Business
    - Get a push notification when you receive an email from your boss.
    - Get today's weather forecast (Instant).
    - Send a customized email when a new file is added to SharePoint document library.
    - Click a button to email a note.

- Get a push notification with updates from a blog.
- Post messages to Teams when a new task is created in Planner.

65. Describe loops and conditions including switch, do until, and apply to each

- Loops
    - Runs an action until the end of the loop, then moves on to the next step in the flow.
- Switch
    - What to run next, based on conditions from input.
- Do Until
    - Runs an action until a condition is TRUE.
- Apply to each.
    - Runs a set of actions for each item in an array.

67. Describe approvals

- A trigger is launched:
    - Maybe a request has been made in SharePoint.
- An email request is sent to the approver and the approval center.
- Approval decision is made (approve or reject)
- Email sent to approval center
- Item updated.

67a. Describe the Power Automate apps, including Power Automate Desktop, Power Automate mobile, and Power Automate portal

- Power Automate Portal is the portal that we have been using throughout this course.
    - You go to the Power Automate Portal by going to http://flow.microsoft.com
    - You can create flows, either from scratch or from a template.
    - You can see and run your flows, delete flows and turn them on and off, and see your Run history in the "My flows" list.
    - Add triggers and actions in the Flow designer.
- Power Automate mobile can be downloaded from https://flow.microsoft.com/en-us/mobile/download/
- You can:
    - Create new automated flows, and turn flows on and or
    - Use buttons to run your workflows, and
    - Get push notifications, so you can instantly respond to critical emails, get notifications when a file is added or updated, or when a particular keyword was retweeted.
    - Grant approvals,
    - Monitor flow activity from the Activity Feed.
- Power Automate Desktop allows you to create attended and unattended desktop flows.
    - Attended desktop flows are executed by a user in front of their computer.
        - You need to be logged in to your computer, and you execute it.

- Unattended desktop flows are run by Power Automate automation for a user.
    - You need to be logged out, and Power Automate executes it.
- It is included in Windows 11, and you can download it for Windows 10.
    - Download from https://powerautomate.microsoft.com/en-us/desktop/
    - It can also be run on Windows Server 2016 or later.
- It allows you to:
    - Work across multiple apps, such as SharePoint, Microsoft Excel, Microsoft Outlook and websites.
    - Consolidate data from database, webpages, Excel files, PDFs and other file types.
    - Automate your work,
        - Click UI elements, select tabs in a window or menu options, drag and drop elements or a tree node.
        - Fill forms by filling in text fields and drop-down lists, selecting buttons and checkboxes.
    - Organize documents using dedicated files and folders actions
    - Extract data from websites and store them in Microsoft Excel
    - Access websites
        - Create tabs in a browser, click web links, close web pages, extract data and take screenshots.
    - Process emails
        - Launch and close Outlook, retrieve, send, process, save and respond to Outlook mail messages.
    - Extract information from invoices
        - Extract images and text from PDFs.

Power Automate – Build a basic flow

68. Create a flow by using the button, automated, or scheduled flow template
- Button
    - Run when a virtual button is pressed on the mobile app.
    - Run when a physical button is clicked with 3rd party options.
    - Run when a button is pressed inside of Power Apps.
    - Allows you to run on demand.
- Automated
    - Run when data is changed.
        - SharePoint, Dynamics, Outlook
- Schedule
    - Run at a certain time, and reoccurs.

69. Modify a flow
- Edit Flow to modify a flow
- "List runs" shows the run history.
- "Flow checker" gives you insights into questions raised by best practice.

- • "Which areas may be performance/reliability risk?"
- You can Test the flow by clicking "Test".
  - • It will show the flow while running.
  - • You can:
    - • Perform the trigger action manually,
    - • Use data from previous runs,
    - • Use new data using connectors, such as Office 365 Outlook, SQL Server, Gmail and Outlook.com.

Describe Power Virtual Agents capabilities

73. Describe use cases for Power Virtual Agents
- Solve common customer issues automatically
  - • Freeing staff to focus on more complex requests.
- Solve common employee issues automatically

75. Describe topics, entities and actions
- Topics:
  - • How a conversation develops.
  - • This can be started from templates.
  - • A topic has trigger phrases and conversation nodes
    - • Trigger phrases are keywords, questions or phrases related to an issue.
    - • Conversation nodes are how a chatbot should respond and do.
  - • It uses Artificial Intelligence to parse a customer's input.
- When you create a chatbot, the following are created:
  - • Four User Topics as lessons,
  - • System topics, which you will probably need during a conversation
    - • Greeting, Escalate (talk to agent), End of conversation, Confirmed Success/Failure, Goodbye, Start over, and Thank you.
    - • These cannot be deleted, but can be modified.
- Entities are a real-world subject, or a concept of such.
- Examples of entitles:
  - • Phone number,
  - • Zip/postal code,
  - • Address/city/state,
  - • Colors,
  - • Numbers,
  - • Names.
- Actions allow chatbots to call a Microsoft Power Automate flow.
  - • Must be within the same Microsoft Dataverse environment as the chatbot.
  - • Flows must in a solution in Power Automate.
  - • Flows typically use variables for input/output data.

76. Describe message nodes, question nodes, conditions, trigger phrases, and the authoring canvas
- In the "authoring canvas", nodes can be added from five options:
    - Ask a question
        - Identify - Multiple choice options will create multiple choice buttons to the end user. Users may also type their answer.
        - It can then go to different paths in the conversation.
    - Call an action
    - Show a message
        - Can use bold, italics, and numbering.
    - Go to another topic
        - Choose which topic to go to.
    - End the conversation
        - End with survey
        - Transfer to agent.
- In between existing nodes, you can have:
    - Add a condition – Branch based on a condition
- Nodes can also be deleted
    - By clicking on the … and selecting Delete.
- Nodes that have errors will prevent the bot from being published.
    - They can still be saved.
    - Check these errors by going to the "Topic checker".
    - Errors include:
        - Node is missing.
        - Field is missing required data.
        - Expression is invalid, and
        - Variable was deleted, but is still being used.

Power Virtual Agents – Build and publish a basic chatbot

78. Create a chatbot
- Go to https://powervirtualagents.microsoft.com to begin.
    - You need a work/business email address, not a personal email address.
    - It will guide you through the process of creating your account.
- To create additional chatbots, go to the title bar – Bots – New Bot.
- To delete chatbots, go to Settings – General settings – Delete bot.

79. Create a topic
- Go to the navigation pane on the left-hand side, and select Topics – New topic.
    - You can have up to 1,000 topics in a chatbot.
- Enter name, description, and trigger phrases.
    - Use short phrases where possible.
    - Click Save topic to save the topic.
- Design topic's conversation path
    - Open a topic.

- Click on "Go to authoring canvas"
- A series of nodes may be automatically created – these are editable.
- Topics may be switched off.
  - They will not be triggered.
  - Topics can also be copied (duplicated).

80. Call an action

- Power Virtual Agents also enables you to extend your chatbot using Azure Bot Framework Skills.
- If you have already built and deployed bots in your organization (using Bot Framework pro-code tools) for specific scenarios, you can convert bots to a Skill and embed the Skill within a Power Virtual Agents bot.

81. Test a chatbot

- Go to the navigation pane on the left-hand side, and select "Test your bot".
- Click Reset to clear previous conversations.
- If you want to track between topics, click on "Track between topics".
- Enter a trigger phrase.
- Continue the conversation.
- Nodes that are used are shown in green.
  - To go to an earlier place in the conversation path, click on it.

82. Publish a chatbot

- Go to the navigation pane on the left-hand side, and select "Publish".
- The computer will check for errors in the content.
- You can then use the "demo website" link.
  - This is for your team or others who wish to try out the bot.
  - It is not intended to use with customers.
- Then click on Channels to publish onto:
  - Custom website (your own website),
  - Mobile App,
  - Facebook,
  - Microsoft Teams,
  - Skype,
  - Cortana and
  - Slack.
- The presentation may be different in different channels:
  - Welcome messages are not supported in Facebook.
  - Customer satisfaction surveys will be shown as an adaptive card on a website, but text-only in Teams and Facebook.

Additional videos

3. Build solutions that use Common Data Service

- A central data repository for data

Additional videos

- Connects to the Power Platform.
- Includes:
    - Security
        - Authentication/Authorization
        - Roles and permissions
    - Logic
        - Duplicate detection
        - Workflows and actions
        - Business rules
    - Data
        - Centralized management
        - Forms and views
    - Storage and
    - Integration
        - Common Data Model
        - Integration with other services

18. Describe the Power Apps user experience
- The User Experience is based on:
    - Data, with Tables, Rows, Columns and Relationships.
    - User Interface, with:
        - Apps,
        - Site Map,
        - Forms – a set of data entry fields for a given table, and
        - View – how records should be displayed.
    - Logic
        - Business process flow – how you go through a standard process (Needs Dataverse).
        - Workflow – automate business processes without user interfaces,
        - Actions – Start processes from a workflow.
        - Business rules – field requirements, whether fields are shown, validate data.
- Visualizations.

Describe the Common Data Model (CDM)
- The CDM is the output of the Open Data Initiative.
- Provides a platform for your data.
    - A single yet comprehensive view.
    - Can take data across all your business systems.
- Obtain real-time intelligence.
- The output of the CDM uses the same schema, simplifying integration with your solutions.
- Other vendors have also used CDM in their solutions, so you can take advantage of this.

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32. Describe types of filters
- There are four different types of filters:
    - Visual – single visual.
    - Page – a single page in a report.
    - Reports – all pages in a report.
    - Drillthrough – drilling from one page in a report to another page (in the same report or another report).
- Slicers allow for users to apply a filter interactively.
- You can also highlight data. If you click on part of the data, there may be an interaction between that visualization and other visualizations.
    - This may be highlighting the data – showing all the data, but highlighting part of it.
    - It may also filter data in some visualizations.
- These are used in reports, not in dashboards.

43. Power BI – Design data layout and mapping
- Hierarchies:
    - Country – State
    - Year – Quarter – Month – Day (provided automatically as a "date table").

47. Identify and describe types of reusable components including canvas component libraries and Power Apps Component Framework (PCF) components
- New components can be created by going to Tree view – Components – New component.
- Component libraries can save components, so you can reuse them in other apps.
    - If components are updated, makers of other apps will be informed, and allowed to update.
- Power Apps Component Framework (PCF) components are for professional developers and app makers:
    - Create code components for both model-driven and canvas apps.
    - Uses HTML, CSS and TypeScript files.
    - Can be shipped via AppSource.

Additional videos - Describe Power Apps portals

46. Describe portal apps
- Build a website that allows users to interact with Common Data Service data.
    - No-code solution.
    - Website can be anonymous or authenticated.
- Create the website using drag and drop.
- Portals are created as a 30-day trial.

- After it expires, it is suspended and shut down.
- It is deleted after 7 days of suspension.
- Global admin or System admin can convert a trial or suspended portal in a production environment (not a trial environment) to a production portal.
    - You must have 1 Gb of unused storage space in the tenant if you want to create 2 or more portals.
- Base URL can be changed
    - go to Power Apps Portals Admin Center
        - Click on the portal, then go to Settings - Administration,
    - then go to Portal Actions, Change base URL

55. Create a portal by using a template

- Portal templates using Dataverse Data:
    - Dataverse starter portal. Includes the following pages:
        - Default studio template,
        - Page with title,
        - Page with child links
- Portal templates using Dynamics 365 Customer Engagement Apps:
    - Community – forums, ideas, blog, case management, providing feedback
    - Customer self-service – Knowledge articles, submit cases, discussion forums, provide feedback
    - Employee self-service – Knowledge articles, submit cases, streamlining common tasks
    - Partner – External parties: accounts and opportunities.
    - Customer portal: Access to Dynamics 365 Supply Chain Management data
    - From blank.

Additional videos - Describe Power Apps portals

Feature	Partner portal	Community portal	Customer self-service portal	Customer portal	Employee self-service portal
Content Management		Yes	Yes		Yes
Knowledge Management	Yes	Yes	Yes		Yes
Support/Case Management	Yes	Yes	Yes		Yes
Forums	Yes	Yes	Yes		Yes
Faceted Search			Yes		Yes
Profile Management			Yes	Yes	Yes
Subscribe to Forum Thread			Yes		Yes
Comments		Yes	Yes		Yes
Azure AD Authentication				Yes	Yes
Ideas		Yes			
Blogs		Yes			
Project Service Automation Integration	Yes				
Field Service Integration	Yes				
Partner Onboarding	Yes				

All allow:
- World Ready,
- Multi-Language Support,
- Portal Administration,
- Customization and Extensibility,
- Theming,
- Portal Base,
- Portal Workflows,
- Web Notifications,
- Microsoft Identity,
- Identity Workflows,
- Web Forms, and

- Feedback.

56. Describe common portal customizations
- Entity lists and entity forms
  - Tables from Dataverse

57. Identify differences in portal behavior based on whether a user is authenticated
- Users can be authenticated using:
  - Usernames and password stored in the Dataverse,
  - OAuth2 (Microsoft, Twitter, Facebook, Google, LinkedIn, Yahoo)
  - Open ID (Azure Active Directory, Azure Active Directory B2C)
  - WS-Federation and SAML 2.0 (used for integration with on-premises Active Directory and other identity services)
  - Azure Active Directory B2C is the recommended identity provider for authentication.
- These options can be enabled/disabled in Authentication Settings.
- Web roles allow access to:
  - Website permissions –front-side editing permissions
  - Webpage access rules – which pages are visible, and what actions can be taken, and
  - Entity permissions – what access a web role has to an individual Dataverse table.
- One web role can be marked as "Anonymous", and all the others are "Authenticated".

58. Apply a theme to a portal
- Select Themes from the components page
- Select a theme.
- There is also a button for "New theme".
- You can also edit a theme – there is a Theme pane on the right-hand side of your workspace.

74. Power Virtual Agents – Describe where you can publish chatbots
- Chatbots can be published in:
  - Websites,
  - Mobile apps,
  - Microsoft Teams,
  - Facebook,
  - Other messaging platforms.
- They can also provide authentication using OAuth2 identity provider, such as:
  - Azure Active Directory (Azure AD),
  - Microsoft account, and
  - Facebook.

77. Power Virtual Agents – Identify common pre-built entities
Built in common pre-built entities include:

- Age, Date and time, Duration
- Boolean (positive or negative responses),
- City, Continent, Country or Region, Phone number, State, Street address, Zip code
- Color,
- Email (email addresses), URL (website link)
- Names of Event, Language, Organization, Person name,
- Money, Ordinal, Percentage, Speed, Temperature, Weight

83. Power Virtual Agents – Monitor chatbot usage
- Chatbot usage is measured in "billed sessions".
    - It starts when a user topic is triggered.
    - It ends when:
        - the chat session has been closed by the user, or
        - the session is more than 60 minutes or 100 turns (an exchange between user and bot). If this happens, a new billed session starts.
- To find the number of billed sessions:
    - Go to the navigation pane on the left-hand side, and select "Analytics".
    - Go to the Billing tab.
- The default is to show this over the last seven days.
    - This can be changed at the top of the page.

84. Power Virtual Agents – Monitor chatbot performance
- Go to the navigation pane on the left-hand side, and select "Analytics".
- The summary tab/page gives you an overview of performance, with charts for:
    - Charts,
    - Engagement over time,
    - Session outcomes,
    - Resolution rate,
    - Escalation rate, and
    - Abandon rate.
- The default is to show these indicators over the last seven days.
    - This can be changed at the top of the page.
- The Customer satisfaction tab gives you:
    - Topics,
    - Engaged sessions,
    - Resolution/Abandon/Escalation Rate.
    - Average CSAT survey core.
    - Customer-satisfaction Impact score.
- The Sessions tab allows you to download transcripts (X says, Y says)
- Billing shows you the number of billed sessions (covered in the previous section).
- You can drill into Topics from the Summary and Customer Satisfaction tab.