Data Collection Delivery Guide



Cloud Modernization - Discovery

June 2019

Version 6.0

Prepared by

**Microsoft Services**

[](https://aka.ms/securedelivery)

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1. Introduction`
   1. Overview

The Cloud Modernization Toolkit is a PowerShell GUI based tool to simplify the collection of server and workload inventory data.

Some of the Cloud Modernization Toolkit features include:

1. Automated deployment of various discovery tools and pre-requisites, including Azure Resources (Service Map, ARM template deployment)
2. Identification of stale Computer Accounts and specific Operating Systems from Active Directory (AD)
3. MAP Pre-Check for validating the remote ports and services used by MAP toolkit
4. MAP data consolidation and processing for better targeting of servers
5. Validation of inventory data with reporting using integrated dashboards and Power BI
6. Rationalization and Assessment of Applications and Windows Features using Global Catalog
7. Migration Catalog (Dynamics 365) deployment with various upload options
8. Iterative Upload of inventory data into Migration Catalog
9. Scripts and guidance to help with Cloud Discovery and Assessment

* 1. Tools for Discovery

Tabulated below are the Software Products and technologies which may be required for completing the Discovery.

| Product and technology item | Description |
| --- | --- |
| Azure Migrate | Microsoft agentless tool used for initial virtual machine hardware discovery and Azure virtual machine sizing. |
| MAP Toolkit 9.9 | No-cost, agentless utility from Microsoft for performing inventory of Windows Server and Linux environments. |
| Windows Server 2016 | Used for deployment and execution of discovery and assessment tools. |
| Microsoft Dynamics CRM Online | Hosted cloud service configured as a dedicated migration catalog. If required by the Customer, and with solution limitations, CRM can be deployed to an on-premises server. |
| Cloud Modernization Toolkit | Collection of scripts developed by Microsoft. Includes the Data Collection and Processing toolkit, which is used to collect MAP data and import into migration catalog. |
| Service Map | Service Map in Azure automatically discovers application components on Windows and Linux systems and maps the communication between services. Includes the Operations Management Suite Agent and the Microsoft Dependency Agent. |
| BlueStripe FactFinder | No-cost tool when used by Microsoft Services to assist with application dependency mapping when Service Map is not available. This tool will be used for legacy systems for which Azure Service Map cannot be used.  *No support available for this tool. Recommendation is to use Service Map.* |
| Movere | Solution for performing inventory of Windows Server and Linux environments, with advanced Azure Virtual Machine sizing.  *This option is limited to certain accounts in the U.S. and Canada.* |
| Microsoft Active Directory Topology Diagrammer | Reads an Active Directory configuration by using Lightweight Directory Access Protocol (LDAP), and generates a diagram of the Active Directory topology. |
| Data Migration Assistant | No-cost tool used to collect SQL Server data for upgrade / compatibility assessment. Its also used for migration. |
| Web Deploy | No-cost tool used for IIS Web applications assessment and migration. |
| Azure Throughput Analyzer | No-cost tool used to determine how quickly workloads can be migrated to Azure |

* 1. Process Overview

The following table provides a summary of the steps to be followed for Cloud Modernization Toolkit:

| Steps | Description | Tasks | Responsibility |
| --- | --- | --- | --- |
| **1. Preparation** | Ensure pre-requisites are completed | 1. Download required software  (automated or manual) 2. Install and configure any required software (automated)[[1]](#footnote-2) | Customer |
| **2. Inventory** | Gather Inventory data | 1. Identify Computer accounts for Inventory 2. Check port connectivity and permissions 3. Gather inventory using the MAP Toolkit 4. Run ADTD (optional) 5. Gather process data 6. Consolidate multiple MAP databases (if required) | Customer |
| **3. Data Source** | * Connect to the MAP data source * Connect to Configuration Manager | 1. Connect to the MAP/Configuration Manager database | Customer |
| **4. Query** | Review the Data Collected | 1. Run queries as required to help make sure the required data has been collected | Customer |
| **5. Validate** | Ensure servers have been scanned | For MAP Scan Data   1. Check for WMI errors (Windows) 2. Check for SSH errors (Linux) 3. If required: troubleshoot errors and re-run the MAP Toolkit to gather remaining data   For Configuration Manager   1. Check for Configuration Manager Site Systems 2. Check for Hardware and Software Inventory Cycles agent times 3. Check for Stale Agents | Customer |
| **6. Process Data** | Extract the collected data\*\* | 1. Export the MAP Toolkit data to CSV files, and send to Microsoft   or   1. Export the Configuration Manager data to CSV files, and send to Microsoft | Customer |
| Process the extracted data | 1. Process the Application inventory against the Global Catalog | **Microsoft** |
| **7. Catalog** | Create Dynamics 365 Instance | 1. Create a Microsoft Dynamics 365 instance | Customer |
| Upload the data to the Migration Catalog | 1. Configure the Microsoft Dynamics 365 instance 2. Upload the Migration Catalog schema  (aka Managed Solution) to the Microsoft Dynamics 365 instance 3. Upload the customer data to the Migration Catalog | **Microsoft** |

Table 1: Cloud Modernization Toolkit Overview

Note

\*\*Step 6a, Extracting the MAP/Configuration Manager inventory data (in CSV format) can be carried out by the Customer. The CloudMo\_Export.zip file can be shared with Microsoft team via secured DTMv2 file transfer and do not share the MAP/Configuration Manager database as-is.

1. Deploying the Cloud Modernization Toolkit Solution
   1. Prerequisites

The Server hardware and software required for running the Cloud Modernization Toolkit is summarized as follows:

| Component | Hardware and Software |
| --- | --- |
| Hardware | 2-4 x CPU  8 GB RAM (16 GB if deploying BlueStripe FactFinder Management Server)  60 GB+ Operating System volume  120 GB Data volume (required for FactFinder and other discovery tool’s data storage) |
| Operating System | Windows Server 2016 (Recommended)  Supports 64-bit versions   * Windows 10 * Windows 8.1\* * Windows Server® 2016 * Windows Server® 2019 * Windows Server® 2012 R2\*   \*Requires Windows Management Framework 5.1 + (WMF5.1)  <https://docs.microsoft.com/en-us/powershell/wmf/5.1/install-configure> |
| Framework | .NET Framework 3.51 (only for Offline Deployment)  *Required for inventory tools deployed by Cloud Modernization Toolkit - SQL Server 2014, Active Directory Topology Diagrammer, XML Notepad 2007.* |
| Microsoft Updates | All latest operating system updates applied  Supported PowerShell Version is 5.0+ |

Table 2: Cloud Modernization Toolkit Prerequisites

* 1. Download Cloud Modernization Toolkit

Use the URL below to download the Cloud Modernization Toolkit:

* <http://aka.ms/cloudmo-toolkit>

Note

Cloud Modernization Toolkit is password protected. Please reach out to [Cloud Modernization - Development Team](mailto:CloudMo-Dev@microsoft.com?subject=Request%20for%20DCP%20Tool%20Password) with your engagement details. This is for your engagement use only, however you can share this password with your customer directly so that they can deploy the discovery tools and begin the data collection process.

* 1. Cloud Modernization Toolkit Installation

| Step | Description | Screenshot |
| --- | --- | --- |
| 1 | Extract the installation files to the desired location  **CloudModernizationToolkitSetup.msi**  Double Click the application MSI file to install or right click and select Install |  |
| 2 | **Installation Progress…**  ***\*Note -*** *The install is completely silent. Once the installation dialog disappears, you can confirm successful installation* |  |

Table 3: Cloud Modernization Toolkit Installation

* 1. Launching the Cloud Modernization Toolkit

Note

This application requires local administrator rights to run.

| Step | Description | Screenshot |
| --- | --- | --- |
| 1 | Open the Start menu, and type “Cloud” to search for the Cloud Modernization Toolkit |  |
| 2 | Loading Application… |  |
| 3 | Application Welcome Screen |  |

Table 4: Loading procedure

Tip

It is possible to pin the Icon to the Start menu and/or the Taskbar. From there, you can launch the tool by simply clicking on the icon.

* 1. Updating the Cloud Modernization Toolkit

To install a newer version of this tool, simply execute the new **CloudModernizationToolkitSetup.msi** version.

If you have any issues, first uninstall the previous version and then install the latest version.

Note

The Cloud Modernization Toolkit can be uninstalled through 'Programs and Features', however the tool sometimes does not appear in the list when 'Programs and Features' is opened.

If this occurs, then re-open 'Programs and Features' and it should be listed when opened for the second time.

1. Cloud Modernization Toolkit
   1. Step 1: Preparation
      1. Tools Deployment (Online)

Use the steps below to automatically deploy all required tools. In addition, an automated (offline) “Local Media Deployment” is possible for devices without Internet connectivity.

Note

Some of the tools require acceptance of license terms. Keep a check on the screen and follow the guidance to complete such installations. The Cloud Modernization Toolkit won’t proceed with the deployment until the previous install is complete.

Tools Deployment Selection:

* SQL Server 2014 Express x64
* SQL Server Management Studio
* Microsoft Assessment and Planning Toolkit
* Microsoft Data Migration Assistant
* Active Directory Topology Diagrammer
* Azure Storage Explorer
* Azure Throughput Analyzer
* Microsoft Power BI Desktop
* SSMA for Access
* SSMA for DB2
* SSMA for MySQL
* SSMA for Oracle
* SSMA for Sybase
* Windows Azure PowerShell
* XML Notepad 2007
* BlueStripe FactFinder Management Server
* BlueStripe FactFinder Management Console

| Step | Description | Screenshot |
| --- | --- | --- |
| 1 | To start the Automated Deployment   1. Select **1. Preparation** 2. Tick **Enable Deployment** 3. Tick **<Application(s)>** or **Select All Application** 4. Click **Deploy**   ***\*NOTE:*** *Do not deploy the BlueStripe FactFinder tools now. This will be deployed by* ***Microsoft****. It is recommended you only install what is required.* |  |
| 2 | **Deployment…**   The Cloud Modernization Toolkit does the following:   1. Installs .NET Framework 3.51, if not found. 2. Validates if the application is installed Skips if it is deployed 3. Downloads the Installation Media 4. Extract media on the system drive 5. Installs the application 6. Validates the Installation 7. Removes the extracted installation media folders |  |
| 3 | **Deployment Completed…**    Check Log if required.  ***\*NOTE:*** *C:\Users\<username>\Documents\* *Cloud Modernization Toolkit-<Date-Time>.log*  *Untick the “Enable Deployment” once deployment is complete* |  |

Table 5: Preparation Tools Deployment (Online)

* + 1. Tools Deployment (Offline)

If a Local Media (Offline) Deployment is required (for servers without Internet connectivity, then please use the following instructions:

Note

Some of the tools require acceptance of license terms. Keep a check on the screen and follow the guidance to complete such installations. Cloud Modernization Toolkit won’t proceed with rest of the deployment until the previous install is complete.

.Net Framework 3.5 is required should you wish to install some of the tools. In Offline mode you will need to incorporate this within the Operating System Deployment. Ensure you Select Disable .Net Framework 3.5 Installation.

| Step | Description | Screenshot |
| --- | --- | --- |
| 1 | Download all required Software Media using a machine with internet connection.  The download links can be found Accessed via   1. Select **1. Preparation** 2. Select **Download Links** |  |
| 2 | Copy all the software media to the Discovery server before running the Cloud Modernization Toolkit.  The Cloud Modernization Toolkit by default looks for the media under **C:\Downloads**  ***\*NOTE:*** *You are able change the default media location within the Cloud Modernization Toolkit to your preferred download location.* |  |
| 3 | To start the Local Deployment   1. Select **Preparation-> Deployment** tabs 2. Tick **Enable Deployment** 3. Tick **<Applications> or Select All Application** 4. Tick **Enable Local Download Media Installation** 5. Enter the Directory Location of the local software media. **Default C:\Downloads** 6. Click **Deploy** |  |
| 4 | **Deployment…**   The Cloud Modernization Toolkit does the following   1. Installs XPS Viewer, if not found. 2. Validates if the application is installed - Skips if it is 3. Check Local Media Install Path for Installation Media 4. Extract media on the system drive 5. Install the application 6. Validates the Installation 7. Remove the extracted installation media folders |  |
| 5 | **Deployment Completed…**  Check Log if required.  ***\*NOTE:*** *C:\Users\Administrator\Documents\* *Cloud Modernization Toolkit-<Date-Time>.log* |  |

Table 6: Preparation Tools Deployment (Offline)

* + 1. Menu Options

The new Cloud Modernization Toolkit have various new Menu options which will dynamically change what is displayed depending on what tools have been installed on the machine.

| Step | Description | Screenshot |
| --- | --- | --- |
| 1 | **Tools**   * Movere (*Weblink*) * Microsoft Assessment and Planning Toolkit (MAP) |  |
| 2 | **Azure**   * Microsoft Azure Portal (*Weblink*) * Azure Storage Explorer * Azure App Service Migration Assistant * Azure Pricing Calculator (*Weblink*) * Azure TCO Calculator (*Weblink*) * Cloud Dockit (*Weblink*) * Azure Migrate (*Weblink*) * Azure Resource Explorer (*Weblink*) * Azure Site Recovery Deployment Planner for VMware (*Weblink*) * Site Recovery Deployment Planner for Hyper-V (*Weblink*) |  |
| 3 | **SQL**   * SQL Server database migration to Azure (*Weblink*) * Microsoft SQL Server Migration Assistant (**SSMA**) |  |
| 3a | **SQL Server Migration Assistant (sub-menu)**   * SSMA Documentation (*Weblink*) |  |
| 4 | **System**   * Event Viewer * Local Users and Groups * Advanced Firewall Management Console * Certificate Management Console * Services Management Console * Remote Desktop Connection |  |
| 5 | **Help**   * Azure Documentation *(Sub-Menu)* * Reference Guides (Cloud Modernization Toolkit Guides) * Microsoft Assessment and Planning Toolkit TechNet (*Weblink*) * Microsoft Privacy Statement (*Weblink*) * About (Cloud Modernization Toolkit Tool Software Information) |  |
| 5a | **Azure Documentation (sub-menu)**   * Azure Documentation (*Weblink*) * Azure QuickStart Templates (*Weblink*) * GitHub Azure QuickStart Templates (*Weblink*) |  |

Table 7: Menu Dropdown Selections

* + 1. Options - Configuration Settings

| Step | Description | Screenshot |
| --- | --- | --- |
| 1 | Select the **Options** tab  Select the **Export** tab from below  Configure or change the default options for the extract data paths and extract file name  ***\*Note:*** *When you exit this screen, any changes made are saved back to the config.xml.* |  |
| 2 | Select the **Options** tab  Select the **Process** tab from below  Configure or change the processing default options for the global catalog data files  ***\*Note:*** *When you exit this screen, any changes made are saved back to the config.xml.* |  |
| 3 | Select the **Options** tab  Select the **Upload** tab from below  Configure or change the CRM package deployer default paths  ***\*Note:*** *When you exit this screen, any changes made are saved back to the config.xml.* |  |
| 4 | Select the **Options** tab  Select the **Tools** tab from below  Configure or change the default tool path options  ***\*Note:*** *When you exit this screen, any changes made are saved back to the config.xml.* |  |
| 5 | Select the **Options** tab  Select the **Azure** tab from below  Configure or change the default Azure tool path options  ***\*Note:*** *When you exit this screen, any changes made are saved back to the config.xml.* |  |
| 6 | Select the **Options** tab  Select the **SQL** tab from below  Configure or change the default SQL tool path options  ***\*Note:*** *When you exit this screen, any changes made are saved back to the config.xml.* |  |
| 7 | Select the **Options** tab  Select the **Telemetry** tab from below  Configure or change the default telemetry options.  Telemetry can be disabled Globally and by each event. Default is all options are enabled  ***\*Note:*** *When you exit this screen, any changes made are saved back to the config.xml.* |  |

Table 8: Options Configuration Settings

* 1. Step 2: Inventory
     1. Active Directory Discovery

Active Directory Discovery helps better target the servers for MAP tool-based discovery, identify stale Computer Accounts and Operating Systems from Active Directory environment.

Follow steps below to connect to a Domain Controller and extract all computer information.

| Step | Description | Screenshot |
| --- | --- | --- |
| 1 | Select the 2**. Inventory** tab  Select the **Active Directory** from the section tab below. |  |
| 2 | Enter a name of computer running the PowerShell Active Directory Module. This can be a Domain Controller or a Local Computer.   1. Enter the Computer name. 2. Click the checkboxes depending on what type of extract is needed – All Computers or Server only or Desktop Only. 3. Click **Connect**   ***\*Note:*** *Depending on the checkboxes selected, separate extract files will be created under C:\Users\<username>\Documents\ ADDiscovery* |  |
| 3 | Enter Credentials that has permissions to extract computer info from Active Directory.  i.e [**Contoso\<UserName>**]  Click **OK** |  |
| 4 | Cloud Modernization Toolkit connects to the computer provided in step 2 by creating a remote PowerShell session. Using the Active Directory PowerShell Module, it extracts the computer information, and stores them in separate CSV files based on the checkboxes selected. |  |
| 5 | Once the extract completes, go to the “ADDiscovery” folder under Documents and go through the files generated.  The important ones to look at are:   * ADExport-AllServerComputers.csv * ADExport-AllComputers.csv * ADExport-ServerComputers90Days.csv   Extract Location: *“C:\Users\<username>\Documents\ ADDiscovery”* |  |

Table 9: Active Directory Discovery Procedure

* + 1. MAP Checker [Environment Check]

The MAP Environment check section to validate the target environment and servers for necessary connectivity (ports\protocols), services and permissions prior to running MAP toolkit inventory scan.

The below steps detail the process on leveraging one of the AD Discovery output (from the previous section) or a custom text file to run the MAP Checker and identify issues that would prevent a successful MAP discovery:

**Computer Name Input File:**

1. ***ADDiscovery Export files:*** You can use any of the ADDiscovery export file (previous section) as input.
2. ***Custom CSV File:*** If using a custom CSV file, make sure the file has a column with header named “**Name**” with list of servers under it.

| Step | Description | Screenshot |
| --- | --- | --- |
| 1 | Select the 2**. Inventory** tab  Select **MAP Checker** from the tab section below. |  |
| 2 | Select the **Computer Name Input File** by using the browse file option.  ***Optional:*** Check “**Open Results in Gridview**” if you want to see the results in a PowerShell Grid-view format immediately after completion of the process.  Click **MAP Check** button. |  |
| 3 | The tool starts connectivity testing one server after the other. |  |
| 4 | Once it completes, the result is shown in a grid-view (only if the Grid-view option is checked). |  |
| 5 | MAP Check **completed**.  Go to Documents folder and look for the output file named “***MAPCheck\_Status.csv***”.  ***\*Note:*** *If the input file has no data or is in the wrong format, the output file will not be generated.* |  |

Table 10: MAP Environment Check Procedure

* + 1. Linux Inventory

The Linux Inventory section is to discover Linux systems across the environment.

The below steps detail the process of leveraging the Linux script to scan the servers for inventory details. This would include all the details, including but not limited to, BIOS information, disk breakdown structure, applications running, etc.:

**Pre-requisites:**

1. **Linux Posh-SSH PowerShell Module:** Make sure this module is installed using the command

Install-Module Posh-SSH -Force -Confirm:$false

1. ***Server IP Address List Input File:*** A text file with list of IP Addresses should be supplied.

| Step | Description | Screenshot |
| --- | --- | --- |
| 1 | Select the 2**. Inventory** tab  Select **Linux Inventory** from the tab section below. |  |
| 2 | Check the **Enable Linux Inventory** option. |  |
| 3 | Select the **Server IP Address List Input File** by using the browse file option.  Click **Scan System** button. |  |
| 4 | A pop comes up for entering log-in credentials  Provide **non-admin** **single user credentials** available on all Linux Servers |  |
| 5 | Scan will run in two phases – **System Inventory** and **Package Inventory**. After each phase files will be generated. |  |
| 6 | Inventory will be generated in **Documents** folder as **\*.csv** for all servers cumulative. |  |

Table 11: Linux Inventory Scan Procedure

* + 1. MAP Toolkit

Proceed with the following section if you are using MAP Toolkit (recommended) to collect the server inventory. For collecting the inventory with Configuration Manager, use section 3.2.5.

* + - 1. Tools Menu – Map Toolkit

| Step | Description | Screenshot |
| --- | --- | --- |
| 1 | The Tools menu has application links to most common tools and services used in the Discovery Phase.  Select the **Tools** Dropdown Menu  Select menu item labelled **Microsoft Assessment and Planning Toolkit**  ***\*NOTE:*** *The MAP Toolkit must be on the same server as the Cloud Modernization Toolkit l to be able to use this option to launch the MAP Toolkit.* |  |
| 2 | **Microsoft Assessment and Planning Toolkit**  start-up screen |  |

Table 13: Microsoft Assessment and Planning Start-Up

* + - 1. Create the MAP Database

When you run MAP tool for the first time you will be prompted to create an inventory database:

1. Launch “**Microsoft Assessment and Planning Toolkit**”.
2. The "Data source" is automatically selected as "MAPS Instance".
3. For the option to create an inventory database name type "**CLOUDMODB01**"   
   (it is recommended increment the last two-digit numbers for each subsequent database created).
4. Enter a description for the database   
   (Region, Datacenter, Subsidiary, Active Directory Domain, etc.)
5. Click "**OK**" to create the database.

Note

It is possible to create a separate database for separate set of data you wish to collect, and switch between databases as required.

If few servers failed inventory and you want to rescan (after fixing), you can use the same database. Any server successfully inventoried will be skipped, and failed ones will be re-attempted.

For example, it is recommended to create a unique database if you want gather data separately by say:

\* Region \* Subsidiary

\* Datacenter \* Active Directory Domain

* + - 1. Configure the MAP Database

Configure the database as follows:

1. Launch "**Microsoft SQL Server Management Studio**".
2. Click "**Connect**".
3. Expand "Databases".
4. The "CLOUDMODBxx"[[2]](#footnote-3) database should be listed.
5. Right-click on the database and select Properties.
6. Select Files and configure the files as follows:
   1. CLOUDMODBxx: Specify 1000 MB for initial size and Autogrowth to grow by 100 MB
   2. CLOUDMODBxx\_log: Specify 250 MB for initial size and Autogrowth to grow by 25 MB
7. Click on the **OK** button to apply the changes.
   * + 1. Collection Tips

Important

These tips are particularly important, so please read through all!

The following are some useful tips for collecting data:

1. **Use a Domain Account:** Log on to the computer using a domain user account. Use of a local computer account on a computer that is a member of a domain will result in authentication failures to remote computers, even if the correct domain credentials are provided to the Inventory and Assessment or Performance Metrics Wizards.
2. **Permissions on MAP Server:** When running inventory collection, some users may experience inventory failures. These failures can be found in the WMI Status column as Failure - Inventory not completed. This issue appears to be related to running without elevated permissions on the MAP computer. Start MAP using elevated permissions (right click and choose "Run as Administrator") and attempt to run the inventory again.
3. **Discovering VMs on Hyper-V:** MAP has a built-in discovery method called host/guest discovery. Host/guest discovery occurs when, during the regular inventory, MAP learns that a machine is a VM host or a VM guest. If MAP is inventorying a VM guest machine, then MAP will learn the name of that machine’s VM host (thus “discovering” the VM host) and then try to inventory that VM host. If MAP is inventorying a VM host machine, then MAP will learn the names of all that machine’s guest VM’s (thus “discovering” those VM guests) and then try to inventory those VM guests. This only applies to Hyper-V and there is no known workaround to this. This will simply result in failed scans and when the MAP Toolkit extracts the MAP Toolkit data, these failed scans are not extracted, hence this will not cause an issue.
4. **Multiple Domains:** MAP can gather inventory information from machines on any domain if the appropriate administrator credentials are provided in the inventory wizard. The machine on which MAP is running does not have to be a member of the target domain or forest.
5. **Running MAP in a guest VM:** If you are using MAP on a virtual machine, even though you have specified that you want to inventory just one machine, the MAP Toolkit detects that it is a virtual machine and attempts to inventory the VM host as well. In this case, the specified credentials may not allow such an inventory to be performed.
6. **Multiple disconnected networks:** 
   1. If you repeatedly run inventory into the same database, the results will be additive:
      1. Any machine successfully inventoried into the current database will not be re-inventoried.
      2. Any machine unsuccessful during previous scans (such as access denied or timed out.) will be re-attempted for inventory.
      3. Any new machines discovered (such as machines that were not previously in Active Directory but that are now there, or new machines imported through flat file) will be inventoried.
   2. After you run several of these inventory cycles, the report(s) generated at the end will be an aggregate of all data. A straightforward way to take advantage of this capability is to:
      1. Put MAP on a laptop and connect the laptop to the various disconnected subnets in your network, rerunning MAP inventory on each segment, or
      2. Put MAP in a Virtual Machine (VM) and likewise move the VM around.
7. **Applications inventory may not contain all the applications:** Applications that use MSI to install themselves should be reported by the tool, however applications that don’t use MSI to install will not be reported—for example, xcopy deployments and any other installer that doesn't use MSI will not be listed.
8. **MAP Database Sizing:** Approx. 1MB for each physical machine and .5MB for each virtual machine inventoried.
9. **Network Impact:** When running inventory, MAP transfers an estimated 512KB to 1MB of data per machine inventoried over the network. The main source of the variance is due to the number of items in the MSI database per machine (how many applications installed, how many patches, and so on).
10. **Security Features:** The following security features are provided by MAP:
    1. All domain accounts used during inventory must be validated in the wizard before the inventory and assessment begins.
    2. None of the credentials provided in the wizard are persisted in the MAP database or any other file. Credentials are encrypted in memory and discarded as soon as the MAP Toolkit is closed.
    3. Communication between the computer performing the inventory and the computer being inventoried is encrypted.
    4. The MAP tool can only be run by a user that is an Administrator on the computer on which it is installed.
       * 1. Collecting Inventory

##### Run the Inventory and Assessment Wizard – Windows Computers

Launch “Microsoft Assessment and Planning Toolkit”, select **Server** from the left pane, and then select **Collect inventory data** from the **Server** pane:

| Option | Installation Option |
| --- | --- |
| Inventory Scenario | Windows computers (in addition specify other scenarios as required – in some cases it makes more sense to run a separate inventory for each scenario) |
| Discovery Methods | Select the required Discovery Method/s[[3]](#footnote-4)  For Domain-joined servers it is strongly recommended to use the “Import computer names from a file” and supply the list of computers gathered using the “Active Directory Windows Server Discovery” script |
| All Computers Credentials | Enter one or more accounts to be used to connect and scan detected servers |
| Credentials Order | Set the sequence of credentials to be used |

Table 14: Collecting Inventory Data (Windows)

Important

Before running an inventory of all servers, it is strongly recommended to run an inventory on a representative set of servers, ideally from different AD Domains, workgroups, network locations, etc.

Once complete, follow the section below to resolve any major issues found (permissions, network connectivity). Once the issues are fixed, run full inventory and have the customer resolve individual server issues (for example WMI broken on a specific server).

* + - 1. Collecting Inventory

##### Run the Inventory and Assessment Wizard – Linux / Unix Computers

Launch “Microsoft Assessment and Planning Toolkit”, select **Server** from the left pane, and then select **Collect inventory data** from the **Server** pane:

| Option | Installation Option |
| --- | --- |
| Inventory Scenario | Linux Computers |
| Discovery Methods | Select the required Discovery Method/s  It is recommended to use the “Import computer names from a file” and supply the list of computers or “Scan an IP address range” if the computer accounts are unknown |
| All Computers Credentials | Enter one or more accounts to be used to connect and scan detected servers |
| Credentials Order | Set the sequence of credentials to be used |

Table 15: Collecting Inventory Data (Linux/Unix)

Important

Before running an inventory of all servers, it is strongly recommended to run an inventory on a representative set of servers, ideally from different AD Domains, workgroups, network locations, etc.

Once complete, follow the section below to resolve any serious issues found (permissions, network connectivity).

Once the issues are fixed, run full inventory and have the customer resolve individual server issues.

* + - 1. Resolve Failed Inventories

For several reasons, it is expected that some servers will not return inventory data. Follow this section to identify inventory issues.

Launch “**Microsoft Assessment and Planning Toolkit**”, select **Environment** from the left pane, then select **Generate Inventory Results Report** from the **Options** pane:

1. Open the xlsx spreadsheet generated.
2. Look at the “WMI Status” column.
3. Follow-up on some devices that did not return “Success” to get an idea of what is not working.
   * + 1. Collect Performance Data

The following Performance Scenario is required if performance-related data is required to help with planning, such as a potential migration to Microsoft Azure VMs:

| Collection Scenario | Suggested Options for Discovery Method | Gathers | Collector Technologies Required |
| --- | --- | --- | --- |
| Windows Computers  (if required) | Import computer names from a file | Performance Data | [WMI](#_WMI) |
| Linux-based Machines (if required) | Import computer names from a file | Performance Data | SSH |

Table 16: Collecting Performance Data

For more details refer to [MAP Wiki: Performance Data](https://social.technet.microsoft.com/wiki/contents/articles/13467.map-performance-data.aspx)

Tip

You should plan to collect performance data for at least 2 days, and a good rule of thumb is to collect performance data for the same period for all machines.

* + - 1. Backup Database

Once a full inventory is complete, it is strongly recommended to back up the database. This can be performed from within the MAP Toolkit:

1. Launch “**Microsoft Assessment and Planning Toolkit**”.
2. From the “File” menu option selects “**Manage Databases**…”.
3. Select the database backup and then click on “**Export**…”.
4. Specify a name for the backup (ideally include the name of the database and the date), then click on the “**Save**” button to create the backup.
   * 1. Configuration Manager

Proceed with the following section if you are using Configuration Manager to collect the inventory. For collecting inventory with MAP Toolkit, use section 3.2.4.

* + - 1. Tools Menu - Configuration Manager Console

| Step | Description | Screenshot |
| --- | --- | --- |
| 1 | The Tools menu has application links to most common tools and services used in the Discovery Phase.  Select the **Tools** Dropdown Menu  Select menu item labelled **Configuration Manager Console**  ***\*NOTE:*** *The Configuration Manager Console same server as the Cloud Modernization Toolkit to be able to use this option.*  ***\*NOTE:*** *The Configuration Manager Console Installation is a Manual process and may require Customer approval.* |  |
| 2 | **Configuration Manager Console**  start-up screen |  |

Table 12: Configuration Manager Console Start-Up

* + - 1. Compliance Settings – Configuration Baseline

To collect and extract SQL Server and database data from Configuration Manager, it is required that the following four Configuration Items queries be deployed using one Configuration Baseline.

The compliance condition is set to “False”, this is so the devices will return their current values.

Below are the details of four Configuration Items that need to be deployed.

|  |  |  |
| --- | --- | --- |
| SQL Query | Output | Sample |
| select cast(DB\_name(database\_id) as varchar(255)) +','+ cast(type\_desc as varchar(255) ) + ','+ cast((size\*8)/1024  as varchar(255)) as name\_type\_size from sys.master\_files | DB Name, DB Type, Size in MBs | clip_image001 |
| select SERVERPROPERTY('isclustered') Cluster | Value 0 = Not Clustered  Value 1 = Clustered | clip_image002 |
| select SERVERPROPERTY ('edition') Edition | Edition of SQL Installed | clip_image003 |
| select cast(db\_name(database\_id) as varchar(255))+','+cast(compatibility\_level as varchar(255))+','+cast(state\_desc as varchar(255))  as name\_compat\_state from sys.databases | DB Name, Compatibility Level, Status | clip_image004 |

Table 13: Compliance Settings - Configuration Items

Tip

You should plan to allow Configuration Manager at least 2 days for the agents to report.

* 1. Step 3: Data Source
     1. Connect to a Data Source
        1. Connecting to a MAP (SQL Server Instance) Data Source

| Step | Description | Screenshot |
| --- | --- | --- |
| 1 | Select **3. Data Source** Tab  Select the **MAP** section tab below.  ***\*Note:*** *MAP tool requires you to have an existing instance named “MAPS” on the same machine where you want to install the Microsoft Assessment and Planning (MAP) Toolkit.* |  |
| 2 | Select **Enable Connection** |  |
| 2 | Select **SQL Connection** Dropdown  Select **ENDR Default** | C:\Users\DAVIDM~1.SOU\AppData\Local\Temp\SNAGHTML16a4e9c.PNG |
| 3 | Cloud Modernization Toolkit pre-populates the Server Name, SQL Instance Name and Database Name based on the profile selected above.  Enter the MAP **Database Name** used for inventory.  ***\*Note Default Instance Name***  *Leave this Blank if using a default SQL instance*  ***\*Note Remote SQL Server Connection***  *You can connect to a remote SQL Server if the Cloud Modernization Toolkit is run from a remote machine that is a Domain member as that of the SQL Server.* |  |
| 4 | **[Optional] Enable SQL Security** only if required, to connect with an SQL User account that has permission to the remote SQL Server |  |
| 4a | Enter **SQL Username** and **SQL User Password** |  |
| 5 | Click **Enable SQL Connection** |  |
| 6 | Click **OK** |  |

Table 17: Connecting to MAP Data Source

* + - 1. Connecting to a Configuration Manager (SQL Server Instance) Data Source

| Step | Description | Screenshot |
| --- | --- | --- |
| 1 | Select **3. Data Source** Tab  Select the **Configuration Manager** section tab below. |  |
| 2 | Select **Enable Connection** |  |
| 2 | Select **SQL Connection** Dropdown  Select **ConfigMgr Default** | SNAGHTML51da123 |
| 3 | Cloud Modernization Toolkit pre-populates the Server Name, SQL Instance Name and Database Name based on the profile selected above.  Enter the Configuration Manager **Site** **Database Name**.  ***\*Note Default Instance Name***  *Leave this Blank if using a default SQL instance*  ***\*Note Remote SQL Server Connection***  *You can connect to a remote SQL Server if the Cloud Modernization Toolkit is run from a remote machine that is a Domain member as that of the SQL Server.* |  |
| 4 | **[Optional] Enable SQL Security** only if required, to connect with an SQL User account that has permission to the remote SQL Server |  |
| 4a | Enter **SQL Username** and **SQL User Password** |  |
| 5 | Click **Enable SQL Connection** |  |
| 6 | Click **OK** |  |

Table 14: Connecting to Configuration Manager Data Source

* 1. Step 4: Query
     1. Running Queries while using MAP Toolkit

Note

You will need Read and Execute rights to the MAP Database for this step.

| Step | Description | Screenshot |
| --- | --- | --- |
| 1 | Select **4. Query** Tab |  |
| 2. | Click on the **Query** drop down  Select Query from list i.e. Applications  Click **Run Data Query** |  |
| 3. | Review Data, Repeat Steps to review more SQL Query results.  Use the Search Feature by entering the search item and clicking **Search**. Continue to click Search to scroll though results.  *See Advanced Deployment Configuration to modify the Config.xml to add more queries* |  |

Table 18: Running SQL Query

* + 1. Running Queries while using Configuration Manager

Note

You will need Read rights to the Configuration Manager Database for this step.

| Step | Description | Screenshot |
| --- | --- | --- |
| 1 | Select **4. Query** Tab |  |
| 2. | Click on the **Query** drop down  Select Query from list i.e. Applications  Click **Run Data Query** |  |
| 3. | Review Data, Repeat Steps to review more SQL Query results.  Use the Search Feature by entering the search item and clicking **Search**. Continue to click Search to scroll though results.  *See Advanced Deployment Configuration to modify the Config.xml to add more queries* |  |

Table 15: Running SQL Query

* 1. Step 5: Validate
     1. MAP Toolkit Validation Checks
        1. Check for WMI Errors

Note

You will need Read and Execute rights to the MAP Database for this step.

| Step | Description | Screenshot |
| --- | --- | --- |
| 1 | Select **5. Validate** Tab  Select the **MAP Validation** section tab below.  Click **WMI Data Errors** |  |
| 2 | Review list of Failed Servers |  |

Table 19: Validation (WMI Errors)

* + - 1. Check for SSH Errors

| Step | Description | Screenshot |
| --- | --- | --- |
| 1 | Select **5. Validate** Tab  Select the **MAP Validation** section tab below.  Click **SSH Data Errors** |  |
| 2 | Review list of Failed Servers |  |

Table 20: Validation (SSH Errors)

* + - 1. Check for Powered Off Computer Accounts

| Step | Description | Screenshot |
| --- | --- | --- |
| 1 | Select **5. Validate** Tab  Select the **MAP Validation** section tab below.  Click **Power off VM’s** |  |
| 2 | Review list of Powered Off VMs |  |

Table 21: Validation (Powered Off VMs)

* + 1. Configuration Manager Validation Checks
       1. Check Configuration Manager Site Systems

Note

You will need **Read** rights to the Configuration Manager Database for this step.

The Configuration Manager Site Systems allows you validate and review the Configuration Manager Site System Role topology.

| Step | Description | Screenshot |
| --- | --- | --- |
| 1 | Select **5. Validate** Tab  Select the **Configuration Manager Validation** section tab below.  Click **Config Manager Site Systems** |  |
| 2 | Review Results… |  |

Table 16: Validation Configuration Manager Site Systems

* + - 1. Check Last Agent Inventory Discovery Scans

Note

You will need **Read** rights to the Configuration Manager Database for this step.

The Last Agent Inventory Discovery Scans validation returns all Server Agents who have hardware and software inventory scans older than 14 days.

| Step | Description | Screenshot |
| --- | --- | --- |
| 1 | Select **5. Validate** Tab  Select the **Configuration Manager Validation** section tab below.  Click **Last Agent Inventory Discovery Scans** |  |
| 2 | Review Results… |  |

Table 17: Validation Last Agent Inventory Discovery Scans

* + - 1. Check Inactive Server Agents

Note

You will need **Read** rights to the Configuration Manager Database for this step.

The Inactive Server Agents validation returns all Server Agents that are listed in Configuration Manager you have Inventory scans older than 14 days.

| Step | Description | Screenshot |
| --- | --- | --- |
| 1 | Select **5. Validate** Tab  Select the **Configuration Manager Validation** section tab below.  Click **Inactive Server Agents** |  |
| 2 | Review Results… |  |

Table 18: Validation Inactive Server Agents

* + - 1. Check Total Server Agent Breakdown

Note

You will need **Read** rights to the Configuration Manager Database for this step.

The Total Server Agent Breakdown validation returns the total number of Server Agents status for the Configuration Manager environment.

| Step | Description | Screenshot |
| --- | --- | --- |
| 1 | Select **5. Validate** Tab  Select the **Configuration Manager Validation** section tab below.  Click **Total Server Agent Breakdown** |  |
| 2 | Review Results… |  |

Table 19: Validation Total Server Agent Breakdown

* 1. Step 6: Process Data
     1. Export Data to CSV files

| Step | Description | Screenshot |
| --- | --- | --- |
| 1 | Select **6. Process Data** Tab  Select the **Extract Data** section tab below. |  |
| 2-a | **Enable IP Address Extraction**  Check this option, if you want to extract the IP address of the servers from the MAP inventory database. The IP address will be stored in Server.csv file along with other inventory data.  You will then be asked to read and accept “[Microsoft Privacy Statement](https://www.microsoft.com/EN-US/privacystatement/OnlineServices/Default.aspx)” before proceeding. |  |
| 2-b | Click **Extract**  ***\*Note:*** *Extracting the MAP inventory data (in CSV format) should only be carried out by the Customer. Share the CloudMo\_Export.zip file with Microsoft team via secured DTMv2 file transfer and do not share the MAP database as it is.* |  |
| 3 | Review Log Results  *Default Export Log Location*  *%USERPROFILE%\Documents* |  |
| 4 | Exported Files  *Default File Export Location*  *%USERPROFILE%\Documents\ENDR* |  |
| 5 | To get BVS Data Extracted, **Enable BVS Extraction**  BVS option will help you gain information regarding the Business Value Services in respective to your movement to cloud. |  |

Table 22: Extracting to CSV Procedure

* 1. Step 7: Migration Catalog

During this step, the following will be performed:

Import managed custom solutions

Microsoft Dynamics 365 Online tenant

Create tenant

Bulk import .CSV customer data

Verify and Test

Customer Access

* + 1. Dynamics 365 Online Instance

The following deployment steps will be performed:

1. The Microsoft Dynamics 365 Online instance is created.
2. The Microsoft Dynamics 365 Online instance is configured.
3. The Microsoft Dynamics 365 Online 30-day trail license is extended to 1-year.

The instructions below can be used to create a new Dynamics 365 Trial instance in a new Office 365 subscription. It should be possible to rather create the Dynamics 365 Trial instance in the customer Office 365 subscription if they already have one.

A key benefit to this approach is that it can potentially be managed under this subscription in terms of administration as well as linking to existing user accounts.

* + - 1. Create Dynamics 365 Online Instance

Use the following steps to create a Dynamics 365 Online Instance:

|  |  |  |
| --- | --- | --- |
| Steps | Description | Screenshot |
| 1 | Open a browser window in “InPrivate” or “Incognito” mode.  (The easiest way to do this is to press  Ctrl+Shift+P from IE or Edge) | Machine generated alternative text: |
| 2 | **Copy and paste the following URL into the InPrivate session:**  <https://aka.ms/cloudmo-crmtrial>  Complete the required information in this page.   * 1. Select the region.   Warning: The region specified will determine the location where the Microsoft Dynamics 365 instance will be created. This cannot be changed once the instance has been created.   * 1. Enter First Name “**CRM**” and for Last Name specify “**Admin**”.   2. Enter your e-mail address to send login URL, account name and info.   3. Enter customer’s valid phone number.   4. Enter customer’s company name.   5. For language, leave this as English.   Warning: Languages other than English have not been tested and may cause issues if used.   * 1. For Organization size, select the no. of anticipated users who would need access to the Migration Catalog.   Note: By default, only 25 user licenses are provided in trial instance   * 1. Click Next. |  |
| 3 | Complete the required information in the page.  Username: **CRMAdmin**  YourCompany: **CloudMo<Customer Name>**  It is recommended to follow this naming convention for all Cloud Modernization engagements.    Click **Create my account**. |  |
| 4 | Complete the required information in the page.  **Note:** Give your mobile number and change the international ISD code to match your country.   * 1. Enter your phone number to receive a code.   2. Click on the “**Text Me**” link. | Machine generated alternative text: Prove. You're. Not. A. Robot.  @ Text me  (+64) v  Text me  O Call me  272713115  x |
| 5 | Enter the **Verification code** once you receive it and click “**Next**”. | Machine generated alternative text: Prove. You're. Not. A. Robot.  x  068191  Didn't get it or need a new code? Try again  Next |
| 6 | You should then be presented with the following screen.    Click on the link that says, **“Set Up”** (it may take a few seconds for this to appear) | Machine generated alternative text: Save this info. You'll need it later.  Sign-in page  https://portal_office.com/  Your user ID  Set u |
| 7 | Select “**None of these. Don’t customize my organization**”.     * 1. Leave the language as English.   2. Change the currency, if required.   3. Click on the “**Complete Setup**” link. | Machine generated alternative text: |
| 8 | The new Dynamics 365 tenant will be created.  Please note this process can take around 10mins to complete. |  |
| 9 | After a few min, the Dynamics 365 Administration page will be displayed.  Make a note of direct URL to access the Dynamics 365 Instance and use it going forward. |  |

Table 24: Create Migration Catalog Instance

* + - 1. Share Dynamics 365 Online Instance credentials.

Use the following steps to share Dynamics 365 Online Instance credentials with Microsoft project team:

|  |  |  |
| --- | --- | --- |
| Steps | Description | Screenshot |
| 1 | Post creation of Dynamics 365 Online Instance, you would receive an email with the **Domain Name** and **User ID.** |  |
| 2 | Share the **Domain Name, User ID** and the **Password** using Secured mail.  In outlook, encrypt this item will help to achieve the required settings. |  |

1. Appendix A: Cloud Modernization Toolkit Discovery Reports
   1. Dashboard and Graphs

| Step | Description | Screenshot |
| --- | --- | --- |
| 1 | Select **Dashboards** Tab  Then select the **Dashboard** page from the section below.  Click the **Refresh** icon on top right corner |  |
| 2 | **Operating Systems**  Select the **Operating System** page from the section below. |  |
| 3 | **SQL Database Servers**  Select the **SQL Database Servers** page from the section below. |  |
| 5 | **Application Category**  Select the **Application Category** page from the section below. |  |

Table 35: Dashboards and Graphs

* 1. Power BI Discovery Assessment Report

| Step | Description | Screenshot |
| --- | --- | --- |
| 1 | Select **Dashboards** Tab  Then select the **Power BI Reports** page from the section below.  Click the **Discovery Analysis Report** Link  ***\*NOTE:*** *Power BI Desktop application is required to be installed before generating a report. The Power BI Desktop Application can be deployed via the Automated deployment feature in the 1. Preparation Tab* |  |
| 2 | Click on the Power BI **Discovery Analysis Report** (Power Bi Template File .pbit)  Right-Click and Select **Open** |  |
| 3 | Power BI Desktop Application Opening… |  |
| 4 | Click **Already have a Power BI Account**  *If you would like a Power BI Account, please feel free to fill in this form and Click Done when completed.* |  |
| 5 | Click **X** in the corner  *If you do have a Power BI Account enter it here and click Sign In.* |  |
| 6 | Enter in the ENDR extract location.  Click **Load**  ***\*NOTE****: This report requires that you have done the Global Catalog Processing* |  |
| 7 | Loading Extract CSV Files into Power BI Discovery Assessment Report… |  |
| 8 | Completed the Title Page Information  Save the Report to you desired location.  Use the Tabs to navigate the different reports. |  |
| 9 | Select any Server Name  Right Click the Name  Select **Drill through** and then select **Analysis Server Configuration** |  |
| 10 | **Analysis: Server Configuration Report Tab**  Provides Server Overview.  This also lock all other tabs just for this Server |  |

Table 36: Power BI Discovery Assessment Report

1. Appendix C: Performance Data

The MAP performance data (if collected) can be helpful for making migration and consolidation related decisions.

The following sections give more details on the logic behind the performance metrics gathered.

* 1. 95th Percentile of a Performance Metric

When you collect performance data with MAP, a variety of performance metrics are sampled every 5 minutes for the included machines. Consider the metric %CPU utilization for a hypothetical machine Guest1. The sequence of %CPU utilization samples taken from Guest1 over time might look like the following where each pair is the elapsed time expressed as Hours:Minutes:Seconds since data collection began followed by the %CPU utilization:

(00:00:00, 25.5), (00:05:00, 36.2), (00:10:00, 24.4), (00:15:00, 41.33), (00:20:00, 57.41), ...,(47:55:00, 29.6),(48:00:00, 33.7)

The 95th percentile of a sequence of %CPU utilization samples like the above is defined as the minimum sample S for which 95% of the samples in the sequence are less than or equal to S. Typically, this will mean that 5% of the samples are greater than S.

You should plan to collect performance data for at least 2 days before you can expect to get good values from the 95th percentile aggregate. That said, you should not hesitate to collect performance data for shorter periods of time when doing test runs or familiarizing yourself with the MAP tool.

Another data quality issue to consider is what happens when MAP normalizes the performance data and fills in values for times at which machines are missing values by using aggregates of other samples nearby in time.

A good rule of thumb is to collect performance data for the same period of time for all machines.

* 1. Collect Performance Data

Launch “Microsoft Assessment and Planning Toolkit”, select **Environment** from the left pane, and then select **Collect performance data** from the **Environment** pane on the right:

| Option | Installation Option |
| --- | --- |
| Collection Configuration | Select Platforms: Windows-based machines or/and Linux-based machines (in some cases it makes more sense to run a separate inventory for each scenario)  Select the duration for performance metrics collection: The collection will begin once the wizard has been completed. Select the End date and time when you want to stop the performance data collection.  Enter a date 7 day or more ahead. Recommended: 15 days |
| Choose Computers | Select computers from the list of already discovered machines. OR  Provide a text file with computer names (Hostname or FQDN or IPv4 address) - Recommended |
| All Computers Credentials | Enter one or more account credentials to be used to connect to the machines selected. |
| Credentials Order | Set the sequence of credentials to be used |

Table 30: Performance Collector Data Options

Note

* A minimum of 2 days’ worth of data is needed for the statistical calculations to start lining up with real-world performance.
* A run of 7 days or more is recommended in order to capture any variation in the utilization profiles of the targeted machines over the work week plus the weekend.
* If there is reason to believe that the utilization profiles may vary for some other reason, such as end-of-month activities, then the performance collection should be run during that period of time as well.
* Be aware that gaps of time between performance collection runs can affect the calculations used for aggregating performance data. It is therefore recommended that you not have long gaps of time, and that you collect from the same set of machines each time.

<https://social.technet.microsoft.com/wiki/contents/articles/13467.map-performance-data.aspx>

1. Appendix D: MAP Database Versions

The following provides a summary of the version numbers for MAP 9x databases:

| MAP Toolkit Version | Database Build Number |
| --- | --- |
| 9.4 | 5769 |
| 9.5 | 5771 |
| 9.6 | 5775 |
| 9.7 | 5776 |
| 9.8 | 5778 |
| 9.9 | 5780 |

Table 31: Microsoft Assessment and Planning Database Versions

To upgrade a MAP Toolkit database to a higher schema version (Ex: 9.4/9.5 to 9.8 schema), simply import or open the database on a machine running MAP 9.9 and it should prompt you to upgrade.

Tip

You can view the database version by going to **File** -> **Create/Select Database** from the MAP Toolkit menu option.

1. The one exception is the BlueStripe FactFinder tool. This will be deployed and configured by Microsoft. [↑](#footnote-ref-2)
2. Where xx is a sequential number for the customer. [↑](#footnote-ref-3)
3. The MAP Toolkit can collect inventory data from computers specified in separate ways and in large numbers. It can collect data from 1000s of machines with minimal network impact. Immediately after inventory collection is done, the toolkit presents summary results in the user interface as pie charts and tables. [↑](#footnote-ref-4)