Microsoft

Infrastructure Migration

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Microsoft

aka.ms/AzureMigrationWorkshop

Abstract and learning objectives

In this whiteboard design session, you will look at how to design an Azure migration for a heterogenous customer environment. The existing infrastructure comprises both Windows and Linux servers running on both VMWare and physical machines and includes some legacy servers. Throughout the whiteboard design session, you will look at the various options and services available to migrate heterogenous environments to Azure.

At the end of this workshop, you will be better able to design and implement the discovery and assessment of environments to evaluate their readiness for migrating to Azure using services including Azure Migrate and Azure Database Migration Service.

Step 1: Review the customer case study

Outcome

Analyze your customer needs.

Timeframe

15 minutes

Customer situation

- Fabrikam Fabrics is a major manufacturer and distributor of clothing and soft furnishing materials.
- Founded in 1972 and based in Columbus, Ohio
- Turnover in 2018 exceeded 350 million USD

Customer situation

- Sprawling IT estate, including a substantial legacy server footprint
  - Windows servers including both x32 and x64 hardware running Windows Server 2003 through to 2016
  - Linux servers running a mix of RHEL 6.10 and 7 series (7.2 through 7.6) and Ubuntu 16.04
  - The above servers comprise both physical machines as well as VMs hosted on VMware infrastructure managed by vCenter 6.5
  - Multiple database engines, including Microsoft SQL Server, PostgreSQL, and Cassandra
- 448 servers identified
- No clear view of entire estate

Customer situation

- The CTO, James Lynch, was hired 6 months ago from outside the company
- Mandate to address ever-increasing IT costs
- Board has approved strategy to migrate as much existing IT infrastructure as possible to Azure
- Goals:
  - Eliminate IT infrastructure overheads
  - Clean house
  - Create a modern, fit-for-purpose IT environment
  - Save costs

Customer needs

- Identify which servers (physical and virtual) can be migrated to Azure, and what modifications (if any) are required.
- Create a road map of prioritized migrations, accounting for ease of migration and dependencies.
- Where suitable, migrate existing servers and databases to Azure as efficiently as possible.

Customer needs

- Where existing servers cannot be migrated, identify alternative migration strategies (refactor, re-architect, etc.) and their pros/cons.
- Prior to migration, accurately forecast the costs associated with each migrated workload, including any third-party licensing costs.
- Post-migration, be able to track costs, control usage, cross-charge business owners, and identify cost-saving opportunities.

Customer objections

- Owners of each business application will require evidence that migration will be successful before granting approval.
- Fabrikam have negotiated an Enterprise Agreement (EA) with Microsoft for their Azure consumption. Any cost estimates need to reflect their EA discount.
- Many applications comprise multiple components or tiers. How can you ensure that these migrations are appropriately orchestrated?

Customer objections

- To reduce business impact, each migration should be designed to minimize application downtime. In addition, to risk, there must be an option to fail-back should the migration experience an unexpected problem.

- We are expecting to move all our existing infrastructure to Azure. Reducing our on-premises server costs should provide substantial cost savings. Can you confirm what savings we can expect?

Common scenarios

Azure Migrate

Azure Migrate can assess your VMware environment for Azure suitability, sizing recommendations and cost estimates.

Azure Migrate supports migration of VMware environments, using an agentless migration architecture.

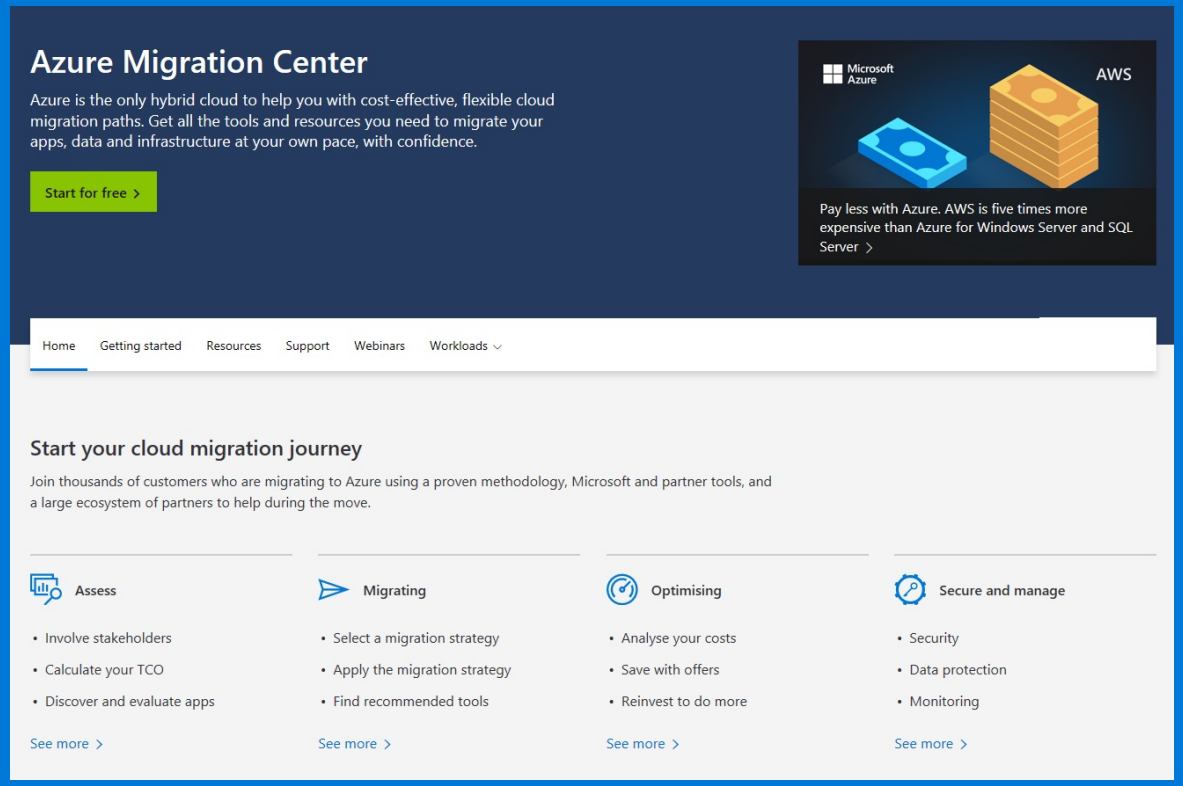
Physical server migration is also supported. Azure Migrate uses a migration engine based on Azure Site Recovery in this case.

Azure Database Migration Service
Microsoft Data Migration Assistant

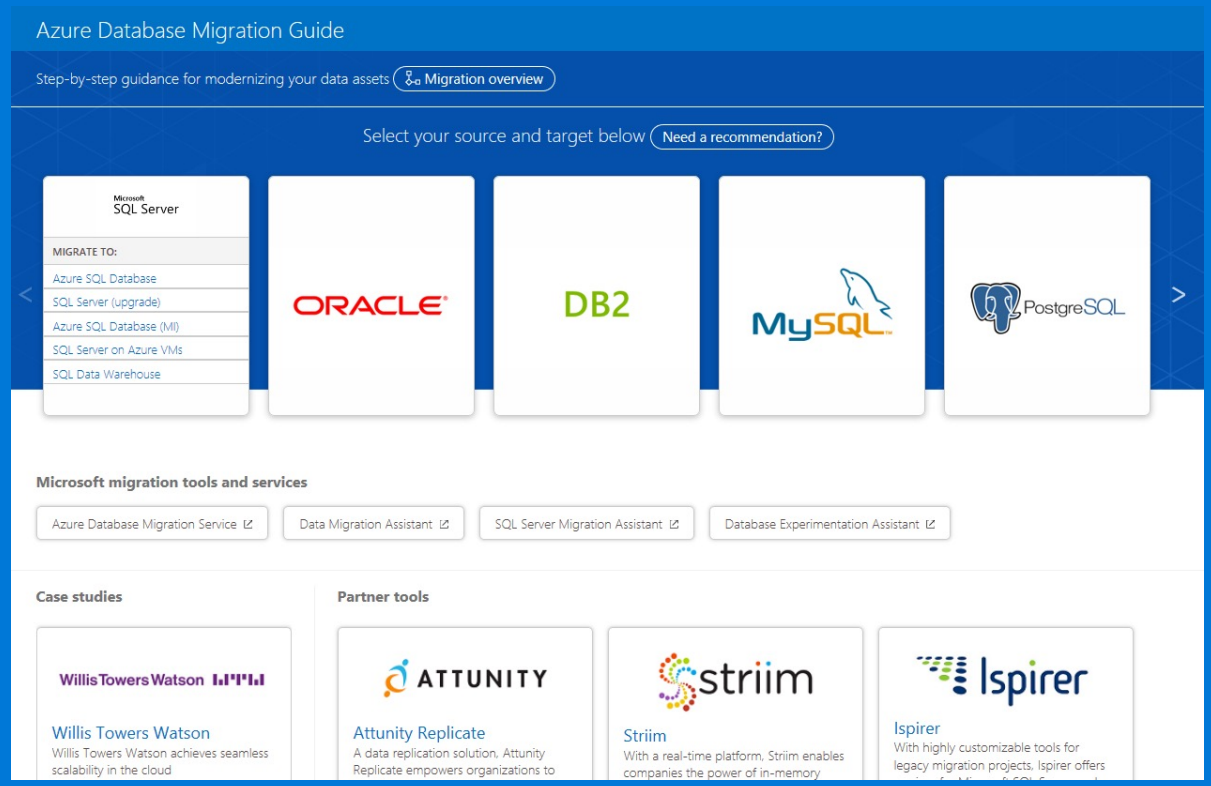
Azure Database Migration Service migrates on-premises database to Azure with minimal downtime.

The Microsoft Data Migration Assistant supports the Database Migration Service by performing database compatibility assessments and schema migration.

Key Resources



https://azure.microsoft.com/migration



https://aka.ms/datamigration

Best Practices

- **Cloud Adoption Framework**
  https://docs.microsoft.com/azure/cloud-adoption-framework/
- **Well-Architected Framework**
  https://docs.microsoft.com/azure/architecture/framework/
- **Azure Landing Zones**
  https://docs.microsoft.com/azure/cloud-adoption-framework/ready/landing-zone/

Step 2: Design the solution

Outcome

Design a solution and prepare to present the solution to the target customer audience in a 15-minute chalk-talk format.

Timeframe

60 minutes

Business needs (10 minutes)	• Respond to questions outlined in your guide and list the answers on a flipchart
Design (35 minutes)	• Design a solution for as many of the stated requirements as time allows. Show the solution on a flipchart
Prepare (15 minutes)	• Identify any customer needs that are not addressed with the proposed solution • Identify the benefits of your solution • Determine how you will respond to the customer's objections • Prepare for a 15-minute presentation to the customer

Step 3: Present the solution

Outcome

Present a solution to the target customer in a 15-minute chalk-talk format.

Timeframe

30 minutes (15 minutes for each team to present and receive feedback)

Directions

- Pair with another table.
- One table is the Microsoft team and the other table is the customer.
- The Microsoft team presents their proposed solution to the customer.
- The customer asks one of the objections from the list of objections in the case study.
- The Microsoft team responds to the objection.
- The customer team gives feedback to the Microsoft team.

Wrap-up

Outcome

Identify the preferred solution for the case study.
Identify solutions designed by other teams.

Timeframe

15 minutes

Preferred target audience

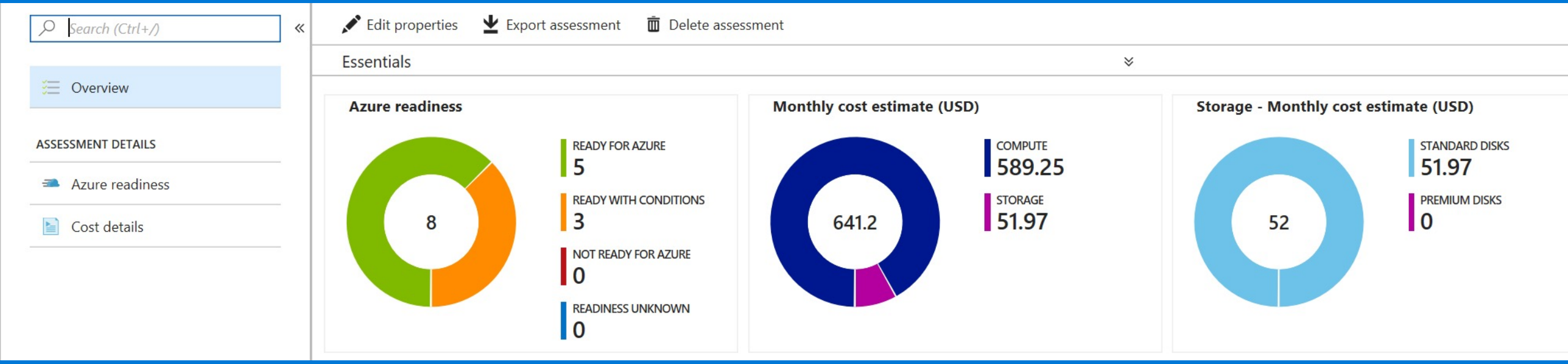
- James Lynch, CTO
- Relevant IT department heads under James
  E.g. Head of Operations, Head of Application Development, etc.
- Business application owners
- CFO - to understand cost implications, including the CapEx/OpEx switch
- CSO - to understand security implications

Preferred solution

- Migration Assessment
  - VMware: Azure Migrate
  - Physical Servers: Azure Migrate with third-party tools
  - Databases:
    - SQL Server: Microsoft Data Migration Assistant (DMA)
    - PostgreSQL and Cassandra: Third-party tools (where available)
- Migration Execution
  - VMware: Azure Migrate (agentless VMware migration)
  - Physical Servers: Azure Migrate, port disks or third-party tools
  - Databases:
    - SQL Server and PostgreSQL: Azure Database Migration Service (DMS)
    - Cassandra: CQL COPY, Databricks table copy, or third-party tools
  - Other: re-install, refactor, re-architect, rebuild – or **Azure VMware solution**

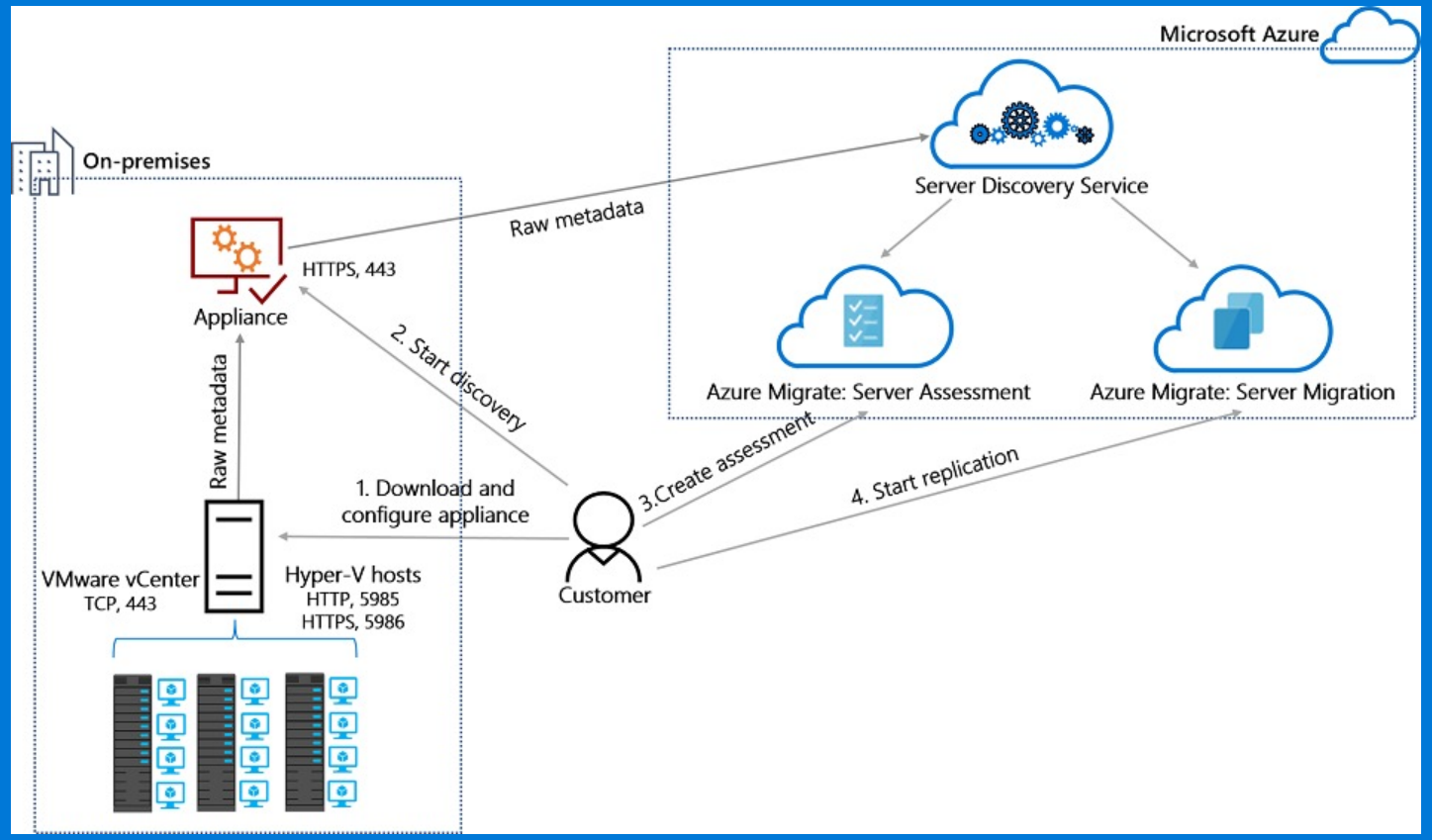
Preferred assessment solution: Azure Migrate

- Assess suitability for migration
- Visualize dependencies
- Sizing recommendations
- Cost estimates



Preferred migration solution: Azure Migrate

- Agentless or agent-based VMware migration options
- Physical and Hyper-V support
  - Using Azure Site Recovery migration engine
- Integrated with Migration Assessment
- Incremental data transfer
- Test failover

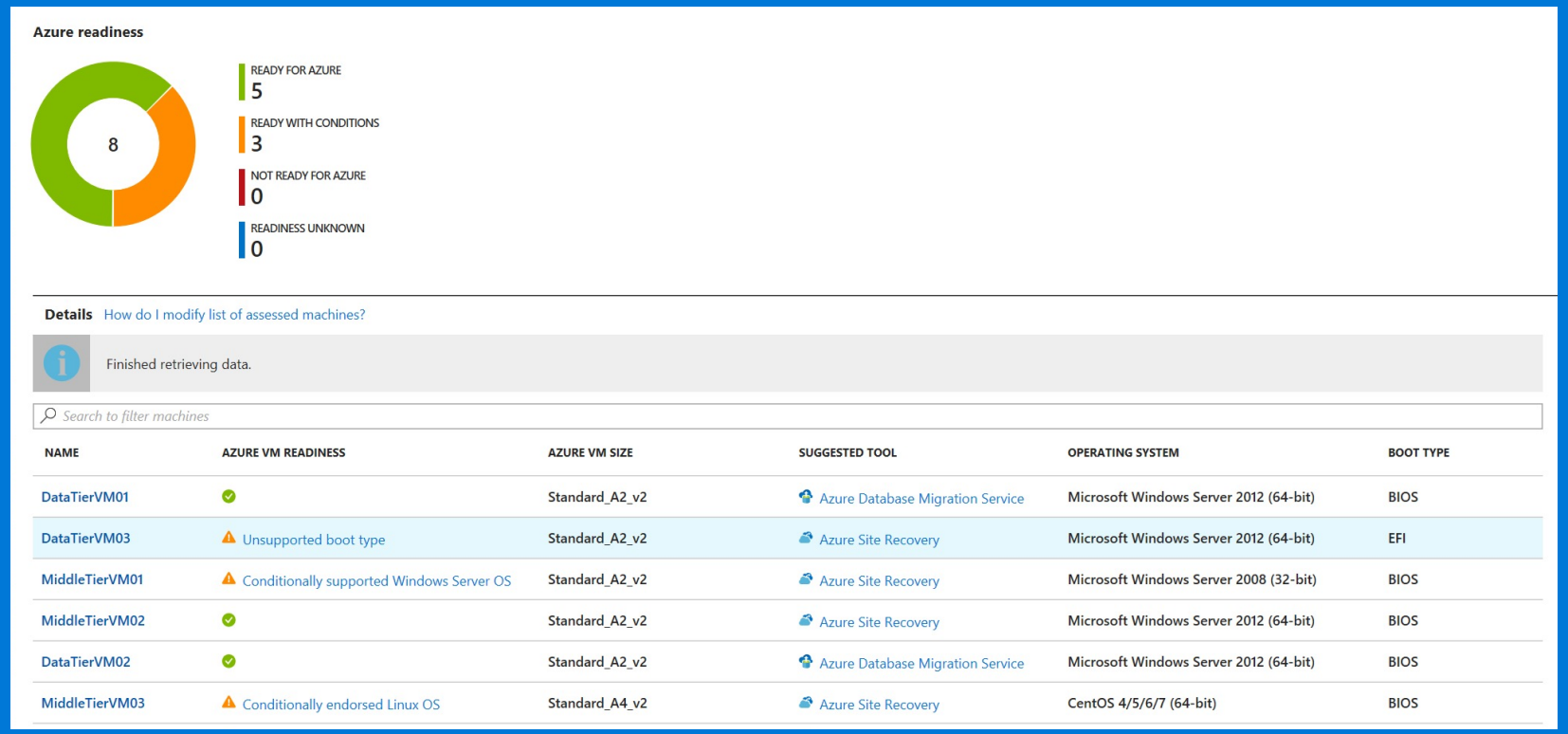


Preferred solution: Azure Database Migration Service

- Use Database Migration Assistant (DMA) for SQL assessment
- Use DMS for schema migration and data migration
- Supports migration to Azure SQL Database services or SQL on Azure VMs
- Two migration modes
  - Offline: simple and easy
  - Online: minimize downtime
- Supports SQL Server, MySQL and PostgreSQL
  - Use Cassandra tools or 3rd-party tools for Cassandra database

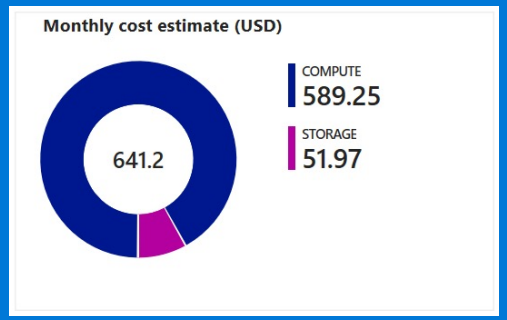
Solution Details: Readiness Report

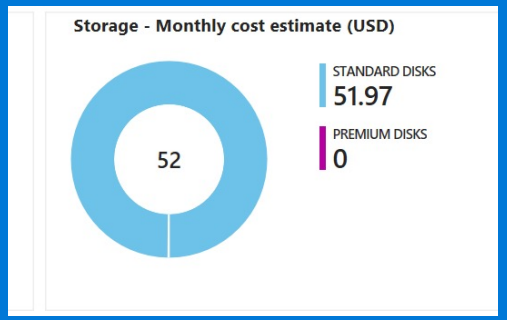
- VM Readiness
- Recommended size
- Suggested migration tool

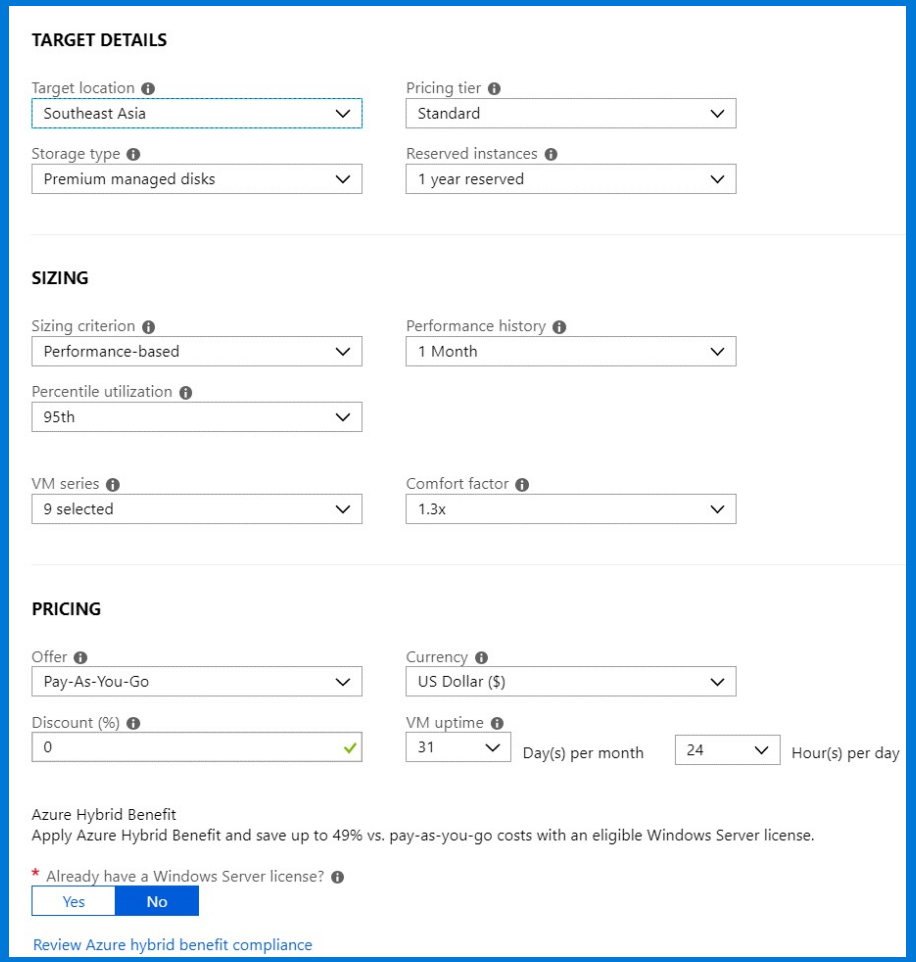


Solution Details: Cost Estimate

- Configure target environment parameters to tune pricing estimate

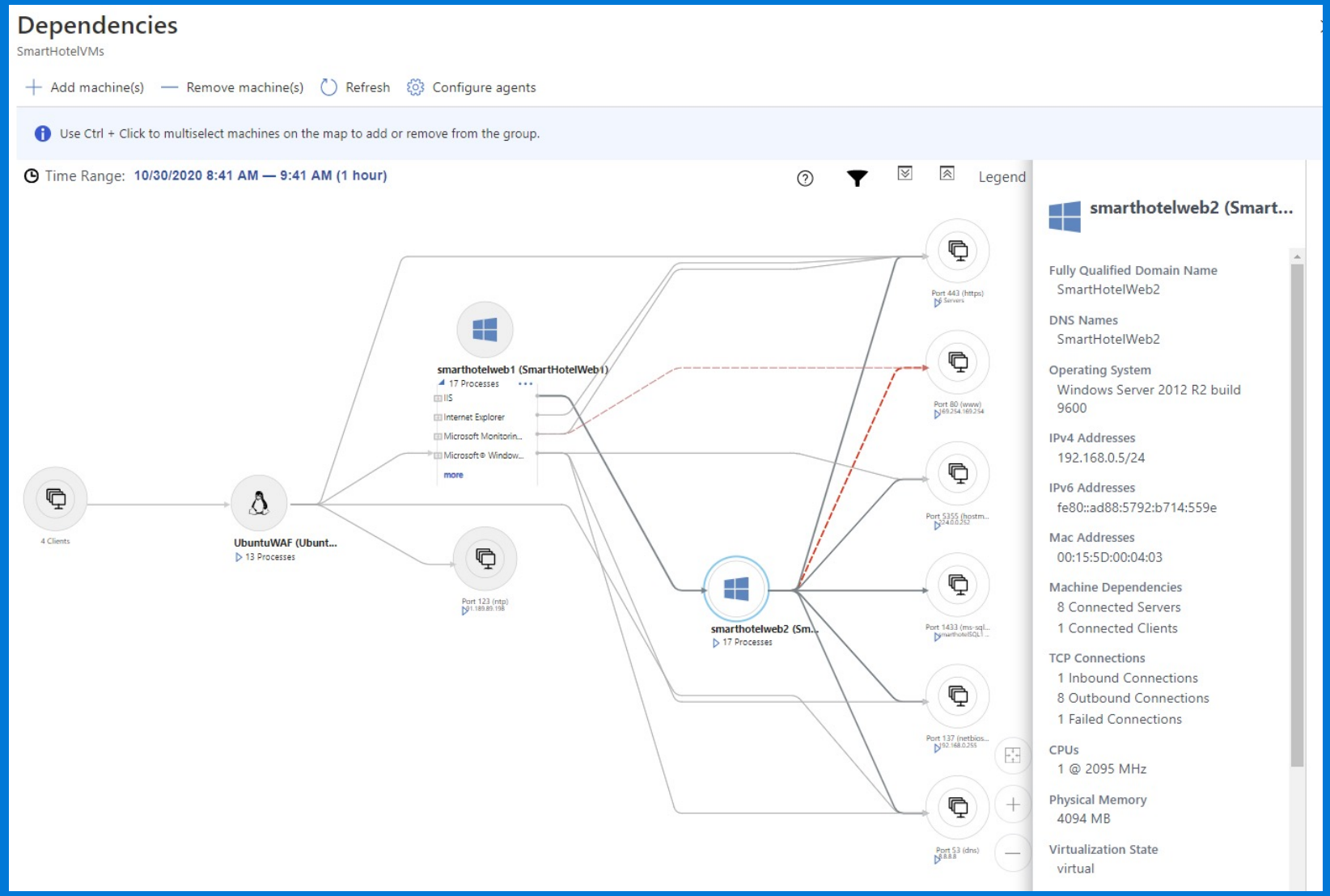






Solution Details: Dependency Visualization

- Creates map of VM network dependencies
- Identify related machines to plan migration groups and dependencies



Solution Details: Migration

- Prepare Azure environment
  - Accounts, permissions, storage, network…everything except the VMs and their disks
  - Use Azure Landing Zones for best practices and reusable deployment artifacts
- Deploy on-premises components
  - VMware (agent-less): Azure migrate appliance VM; nothing to install on each VM
  - VMware (agent-based) or physical servers: Replication appliance VM or server; plus Mobility Service agent on each VM or machine to be migrated
- Configure replication policy and enable replication
- Perform test failover and verify

Solution Details: Migration

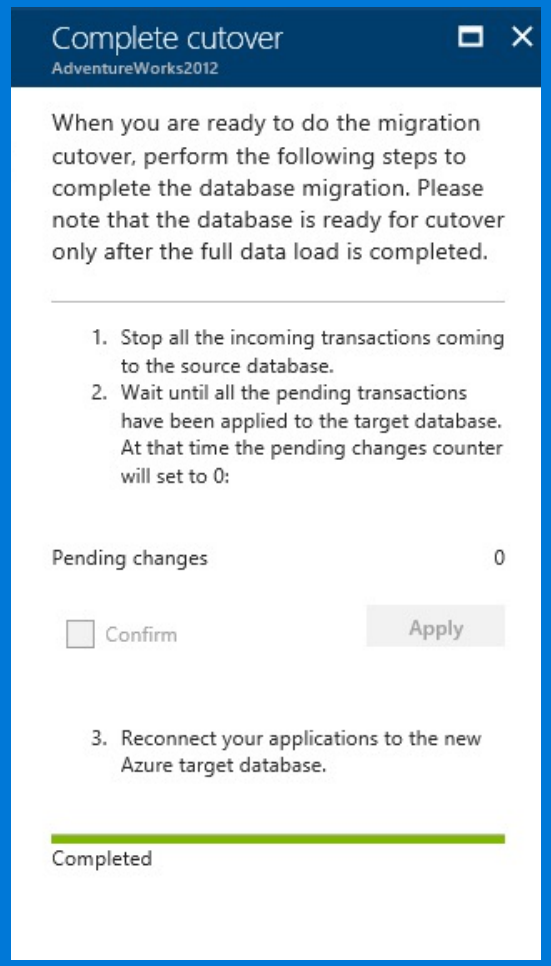
- Cut over
  - Update application settings (connection strings, configurations, etc)
  - Acceptance testing
  - Endpoint update (typically DNS change)
- Post-migration
  - Install VM agent / uninstall Mobility Service agent
  - Review Azure Advisor / Security Center recommendations
  - Apply principles from the Azure Well-Architected Framework
    - Cost optimization (e.g. right-sizing, apply discounts, shut down in off hours)
    - Operational excellence (e.g. monitoring)
    - Performance efficiency (e.g. auto-scale)
    - Reliability (e.g. high availability, backup and DR)
    - Security (e.g. enable disk encryption, network access, Azure RBAC)

Solution Details: Database Migration Service (DMS)

- Use DMA for assessment
  - Install on any machine with database access
- Use DMS for schema and data migration
  - Create target DB in Azure
  - Create VNet with access to source and target DBs
    - DMS deploys into this VNet for connectivity
    - Use S2S VPN or ExpressRoute for on-premises access
    - Requires Internet access on TCP ports 443, 53, 9354, 445, 12000
    - Database access on port 1433 (NSGs, firewalls)

Solution Details: Database Migration Service (DMS)

- Offline migration
  - Wait to complete
  - Reconfigure applications with new database connection details
- Online migration
  - Requires 'Premium' pricing tier
  - Wait for initial data sync
  - Stop incoming transactions
  - Wait for pending transactions to read '0'
  - Stop syncing changes
  - Reconfigure applications with new database connection details



Preferred objections handling

Objection: Owners of each business application need to approve any substantial application change, including migration. Business owners have indicated that they will require evidence that migration will be successful before granting approval.

Answer: Create of a proof of concept deployment, to validate the overall architecture and any assumptions, for example regarding the impact of changes to network latency between application components.

For the migration process itself, Azure Migrate supports a 'test failover'. This creates the Azure deployment in parallel with the existing deployment, allowing the migration process to be verified without risk of production impact. Likewise, database migration using DMS does not impact the existing production database.

Third-party migration tools used for migration of physical servers similarly support a validation step prior to committing the migration.

Preferred objections handling

Objection: Fabrikam have negotiated an Enterprise Agreement (EA) with Microsoft for their Azure consumption. Any cost estimates need to reflect their EA discount.

Answer: Not a problem! Cost estimates from both Azure Migrate and the Azure Pricing Calculator can be tailored to reflect your EA discount.

Preferred objections handling

Objection: Many applications comprise multiple components or tiers. How can you ensure that these migrations are appropriately orchestrated?

Answer: Using Azure Migrate, VMs can be grouped to reflect the application architecture. The dependency visualization feature of Azure Migrate helps identify and configure these groupings.

The migration process can then be staged to migrate different groups of VMs separately. Custom scripts can be used to perform custom pre- and post-migration operations. Similar orchestration is also supported by third-party migration tools, used for physical servers.

Preferred objections handling

Objection: Each migration should be designed to minimize application downtime. There must be an option to fail-back should the migration experience an unexpected problem.

Answer: To ensure data consistency during migration, a short application downtime may be required. With Azure Migrate, incremental replication keeps the duration of this downtime to a minimum.

Similarly, data migration using DMS supports online migration, allowing you to keep your application online while data is synchronized. Only a short downtime window is required to cut over to the new database.

In the event of an unexpected issue arising, the existing deployment remains available as a fail-back.

Preferred objections handling

Objection: We are expecting to move all our existing infrastructure to Azure. Reducing our on-premises server costs should provide substantial cost savings. Can you confirm what savings we can expect?

Answer: It is a common myth that all workloads should move to the cloud, and that the cloud will automatically be cheaper. Careful planning will be required to optimize your Azure deployment, and a cost analysis performed to make sure the business case for migration is sound and fully understood.

The *Build a business justification for cloud migration* guide is a useful resource for dispelling cloud adoption myths and building a realistic business case.

https://docs.microsoft.com/azure/architecture/cloud-adoption/business-strategy/cloud-migration-business-case

Customer quote

"Despite a complex, legacy on-premises environment we have now completed the bulk of our Azure migrations, without incident, in under 9 months.

Our applications are now faster, more reliable, and cheaper and easier to operate and maintain."

James Lynch, CTO

Microsoft