

## Lab15 – Understanding Local Redundant Storage (LRS) - Azure

### **Locally redundant storage (LRS): (Low-cost data redundancy)**

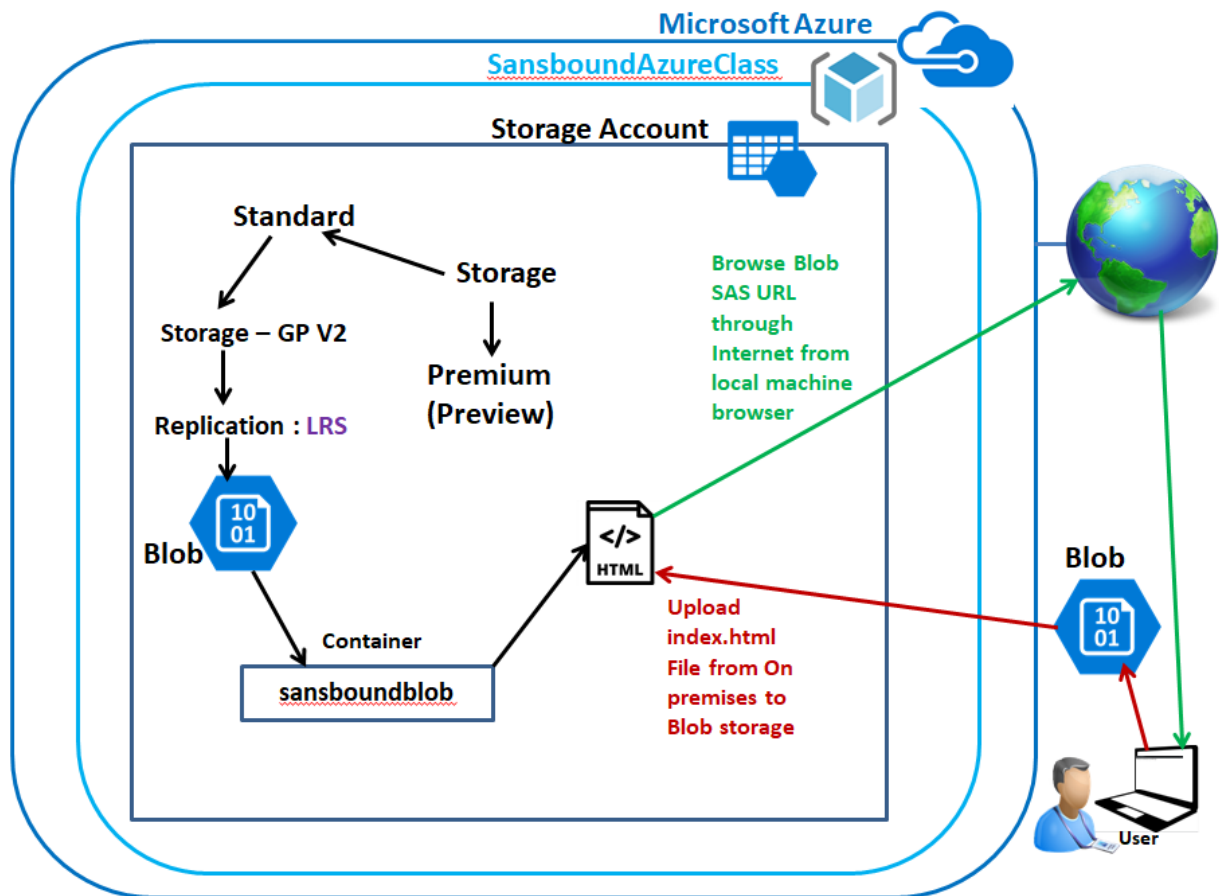
Locally redundant storage (LRS) provides at least 99.999999999% (11 nines) durability of objects over a given year. LRS provides this object durability by replicating your data to a storage scale unit. A datacenter, located in the region where you created your storage account, hosts the storage scale unit. A write request to an LRS storage account returns successfully only after the data is written to all replicas. Each replica resides in separate fault domains and update domains within a storage scale unit.

A storage scale unit is a collection of racks of storage nodes. A fault domain (FD) is a group of nodes that represent a physical unit of failure. Think of a fault domain as nodes belonging to the same physical rack. An upgrade domain (UD) is a group of nodes that are upgraded together during the process of a service upgrade (rollout). The replicas are spread across UD and FDs within one storage scale unit. This architecture ensures your data is available if a hardware failure affects a single rack or when nodes are upgraded during a service upgrade.

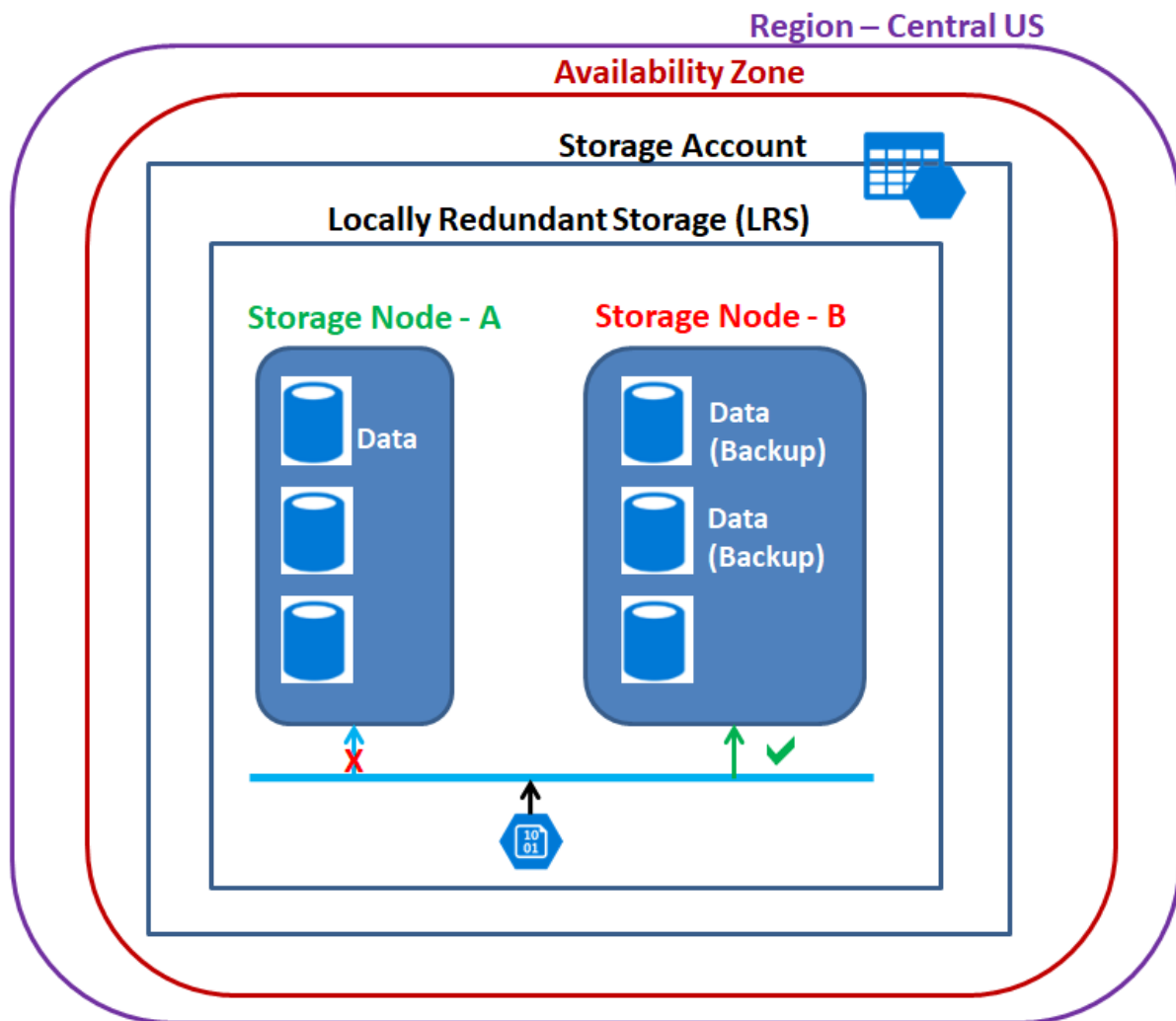
LRS is the lowest-cost replication option and offers the least durability compared to other options. If a datacenter-level disaster (for example, fire or flooding) occurs, all replicas may be lost or unrecoverable. To mitigate this risk, Microsoft recommends using either zone-redundant storage (ZRS) or geo-redundant storage (GRS).

- If your application stores data that can be easily reconstructed if data loss occurs, you may opt for LRS.
- Some applications are restricted to replicating data only within a country due to data governance requirements. In some cases, the paired regions across which the data is replicated for GRS accounts may be in another country.

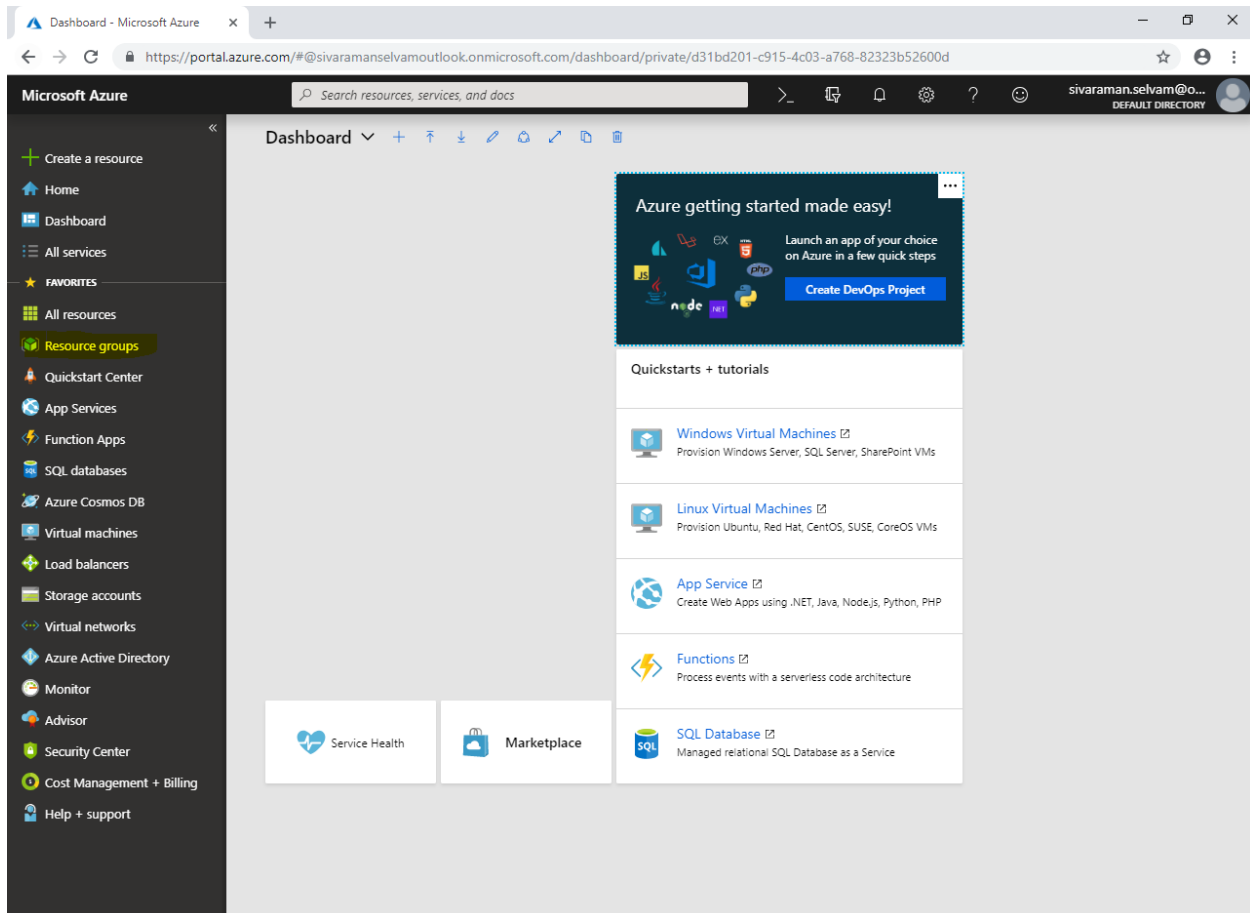
## Topology



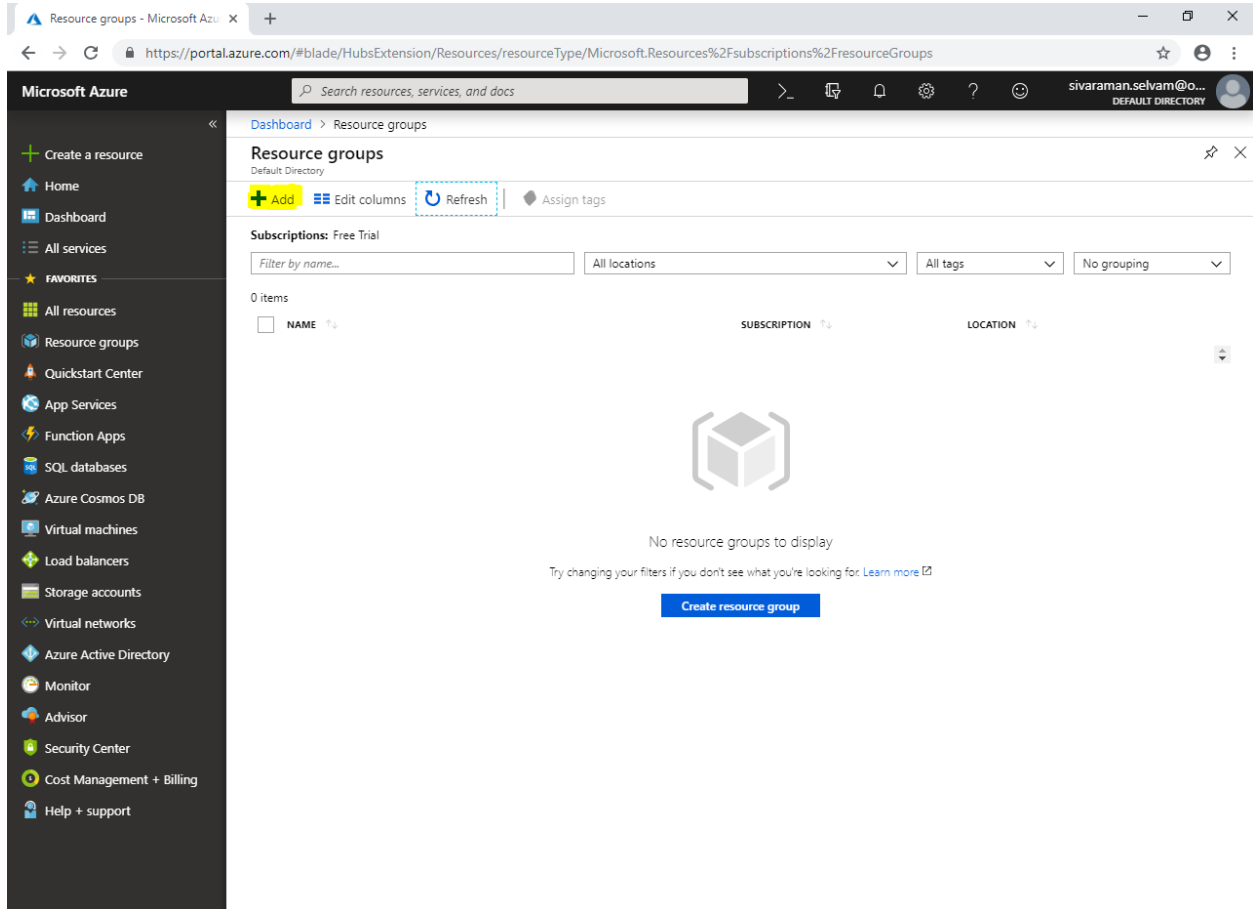
### Locally Redundant Storage (Back-End):



In Azure portal, click **“Resource groups”**.



Click **"Add"**.



The screenshot shows the Microsoft Azure portal interface. The left sidebar contains navigation links such as 'Create a resource', 'Home', 'Dashboard', 'All services', and 'FAVORITES'. The main content area is titled 'Resource groups' and includes a search bar, 'Add', 'Edit columns', 'Refresh', and 'Assign tags' buttons. Below these are filter controls for 'Subscriptions: Free Trial', 'Filter by name...', 'All locations', 'All tags', and 'No grouping'. A table header shows '0 items' with columns for 'NAME', 'SUBSCRIPTION', and 'LOCATION'. A large gray cube icon is displayed in the center of the table area, with the text 'No resource groups to display' and a link to 'Learn more'. A blue button labeled 'Create resource group' is positioned at the bottom of the page.

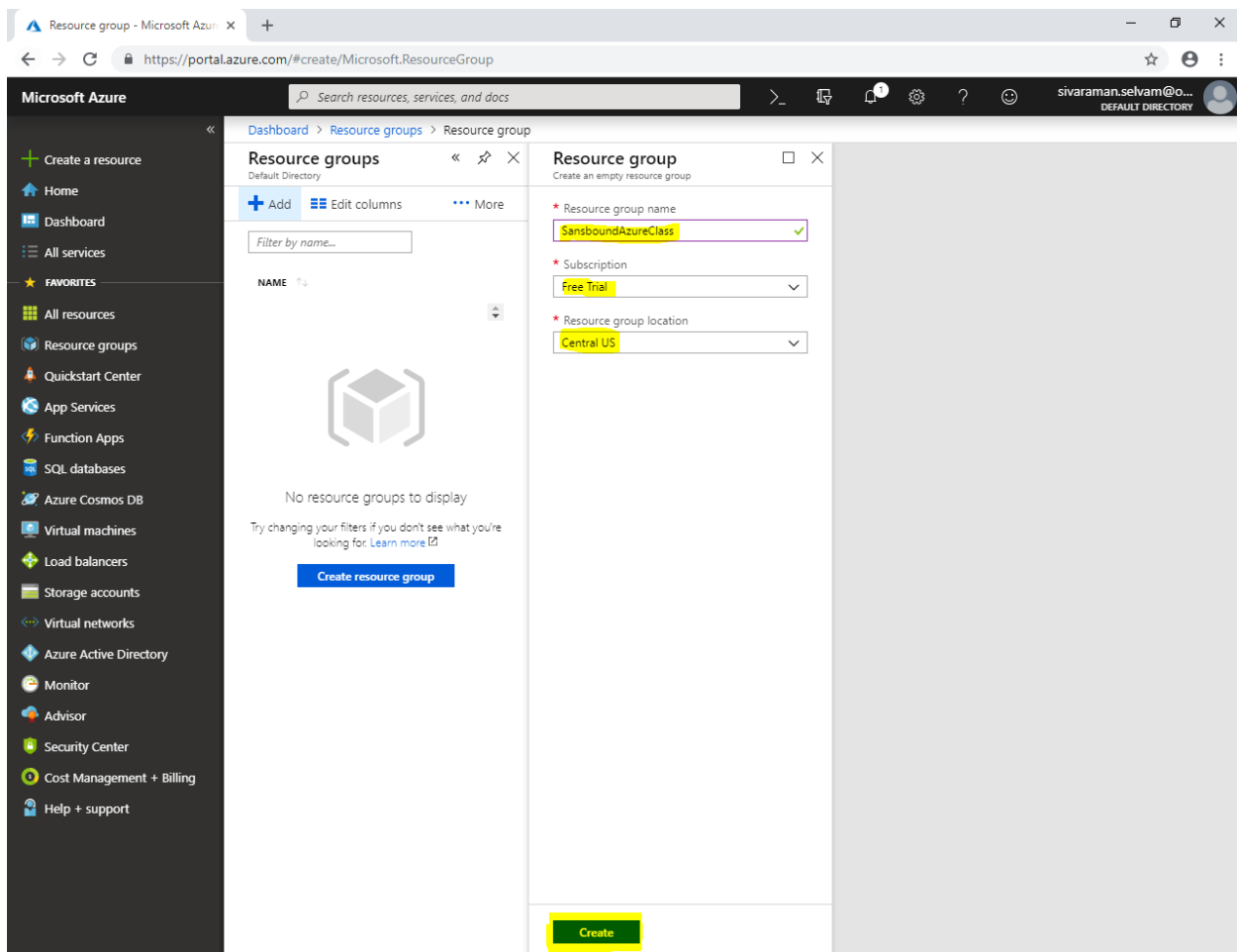
While create “Resource group”

Type “Resource group name” as “SansboundAzureClass”.

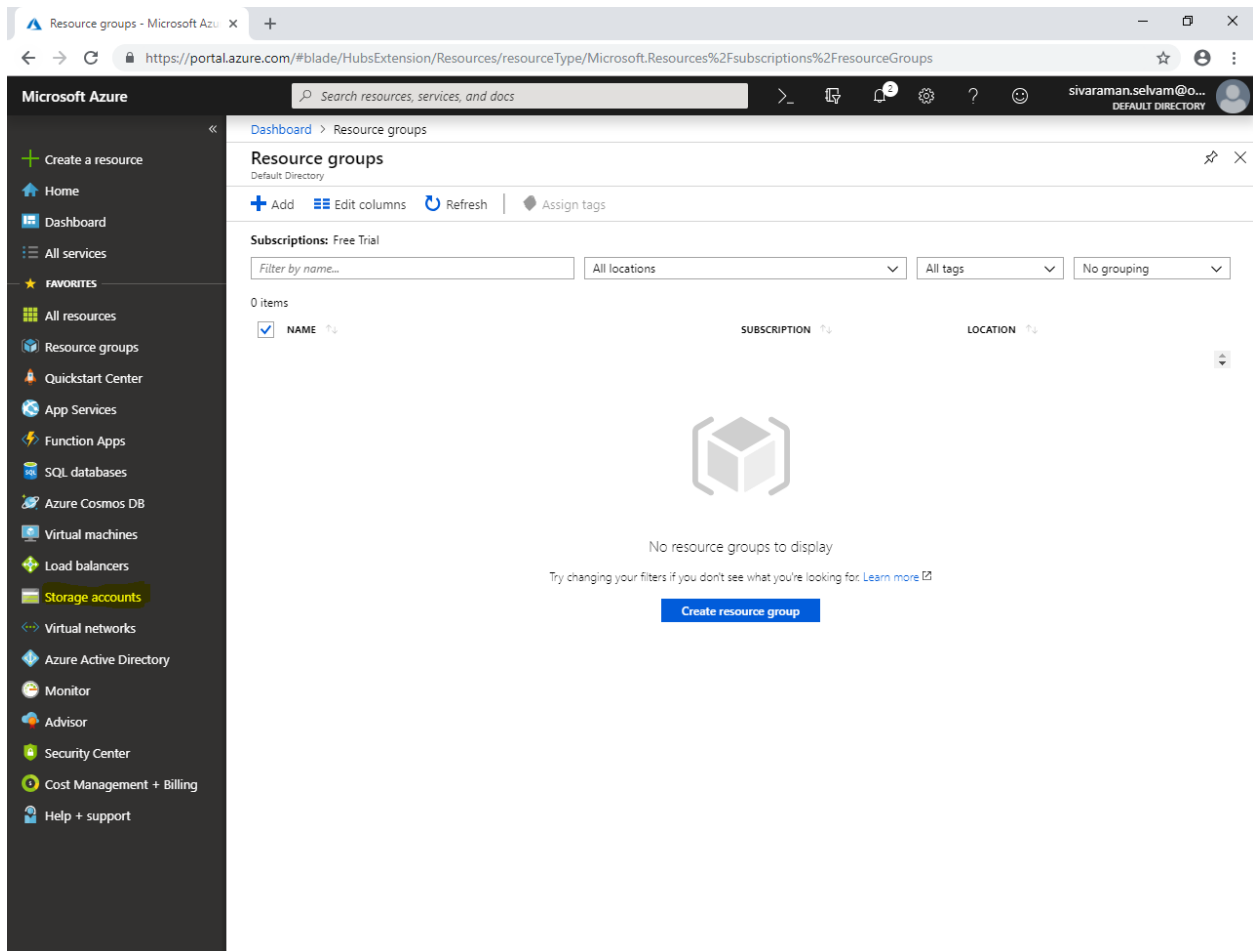
Select “Subscription” as “Free Trial”.

Select “Resource group location” as “Central US”.

Click “Create”.



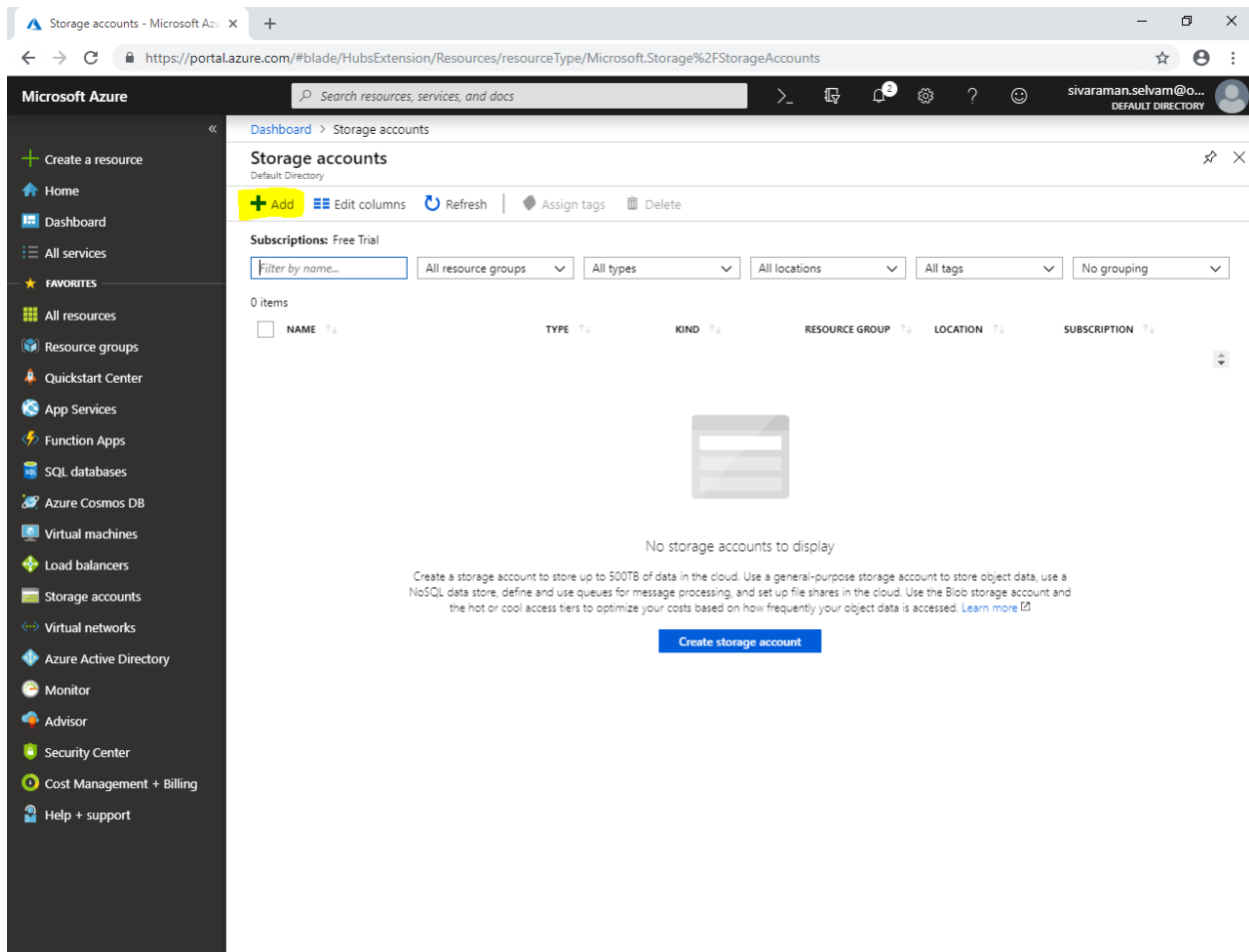
Click **"Storage accounts"** in left side panel.



The screenshot shows the Microsoft Azure portal interface. On the left sidebar, under the 'FAVORITES' section, 'Storage accounts' is highlighted. The main content area is titled 'Resource groups' and shows a list of resource groups. The filters are set to 'Subscriptions: Free Trial', 'All locations', 'All tags', and 'No grouping'. The list shows '0 items'. Below the list, there is a message: 'No resource groups to display. Try changing your filters if you don't see what you're looking for. [Learn more](#)'. A blue button labeled 'Create resource group' is at the bottom.

In **“Storage accounts”**.

Click **“Add”**.



Storage accounts - Microsoft Azure

https://portal.azure.com/#blade/HubsExtension/Resources/resourceType/Microsoft.Storage%2FStorageAccounts

Microsoft Azure

Search resources, services, and docs

Dashboard > Storage accounts

Storage accounts

Default Directory

+ Add Edit columns Refresh Assign tags Delete

Subscriptions: Free Trial

Filter by name... All resource groups All types All locations All tags No grouping

0 items

NAME	TYPE	KIND	RESOURCE GROUP	LOCATION	SUBSCRIPTION
------	------	------	----------------	----------	--------------

No storage accounts to display

Create a storage account to store up to 500TB of data in the cloud. Use a general-purpose storage account to store object data, use a NoSQL data store, define and use queues for message processing, and set up file shares in the cloud. Use the Blob storage account and the hot or cool access tiers to optimize your costs based on how frequently your object data is accessed. [Learn more](#)

Create storage account



Select **"Subscription"** as **"Free Trial"**.

Select **"Resource group"** as **"SansboundAzureClass"**.

Type **"Storage account name"** as **"sansboundlrs"**.

Select **"Location"** as **"Central US"**.

In **"Performance"** click **"Standard"**.

Select **"Account kind"** as **"Storage (general purpose v2)"**.

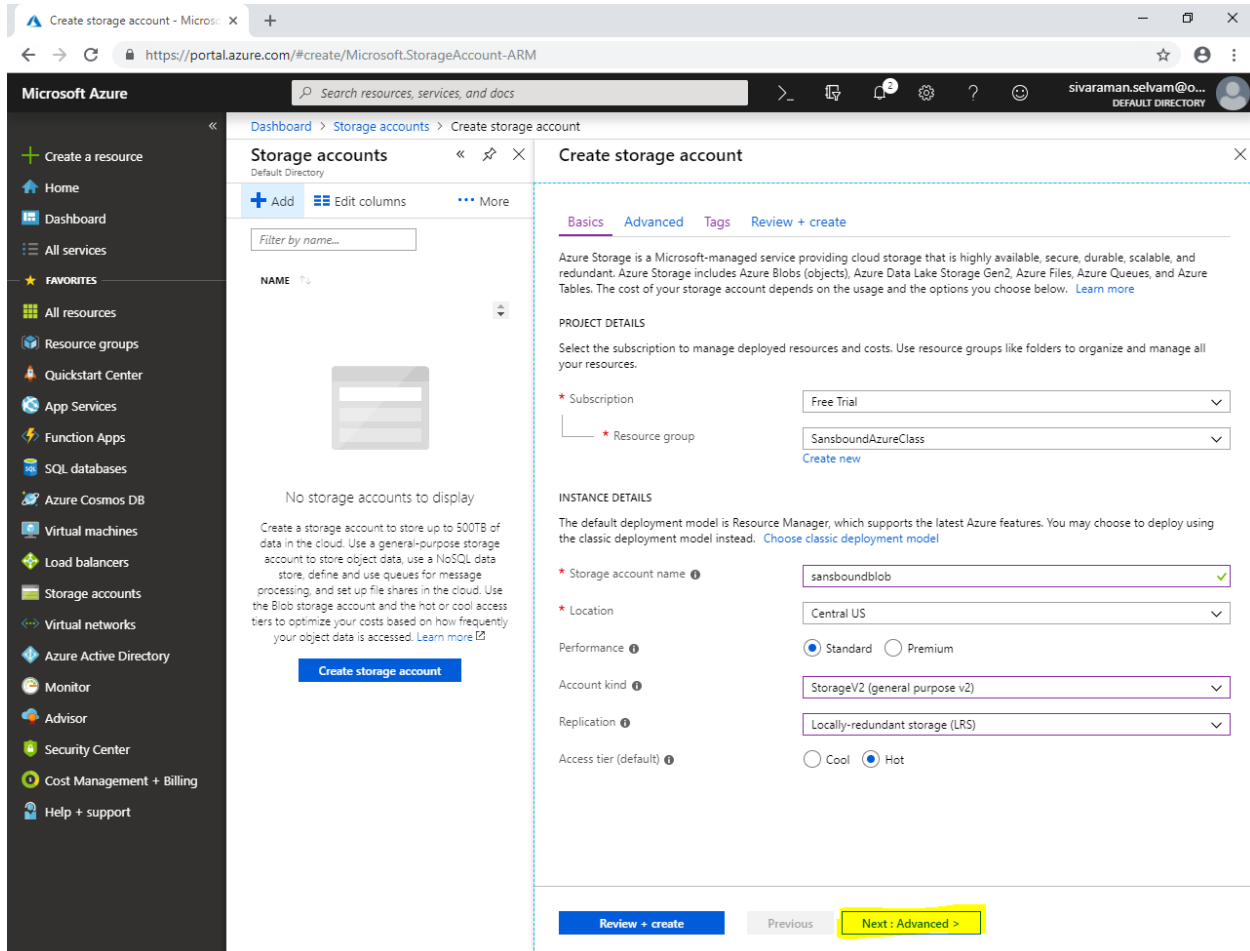
Select **"Replication"** as **"Locally-redundant-storage (LRS)"**.

The screenshot shows the Azure portal interface for creating a storage account. The left-hand navigation pane lists various services, with 'Storage accounts' highlighted. The main content area is titled 'Create storage account' and contains a form with the following fields and values:

- Subscription:** Free Trial
- Resource group:** SansboundAzureClass
- Storage account name:** sansboundblob
- Location:** Central US
- Performance:** Standard (selected over Premium)
- Account kind:** StorageV2 (general purpose v2)
- Replication:** Locally-redundant storage (LRS)
- Access tier (default):** Hot (selected over Cool)

At the bottom of the form, there are three buttons: 'Review + create', 'Previous', and 'Next: Advanced >'. The 'Review + create' button is highlighted in blue.

Click **"Next : Advanced >"**.



Microsoft Azure

Dashboard > Storage accounts > Create storage account

Storage accounts

+ Add Edit columns More

Filter by name...

NAME

No storage accounts to display

Create a storage account to store up to 500TB of data in the cloud. Use a general-purpose storage account to store object data, use a NoSQL data store, define and use queues for message processing, and set up file shares in the cloud. Use the Blob storage account and the hot or cool access tiers to optimize your costs based on how frequently your object data is accessed. [Learn more](#)

Create storage account

Create storage account

Basics Advanced Tags Review + create

Azure Storage is a Microsoft-managed service providing cloud storage that is highly available, secure, durable, scalable, and redundant. Azure Storage includes Azure Blobs (objects), Azure Data Lake Storage Gen2, Azure Files, Azure Queues, and Azure Tables. The cost of your storage account depends on the usage and the options you choose below. [Learn more](#)

PROJECT DETAILS

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

\* Subscription Free Trial

\* Resource group SansboundAzureClass

Create new

INSTANCE DETAILS

The default deployment model is Resource Manager, which supports the latest Azure features. You may choose to deploy using the classic deployment model instead. [Choose classic deployment model](#)

\* Storage account name sansboundblob

\* Location Central US

Performance Standard Premium

Account kind StorageV2 (general purpose v2)

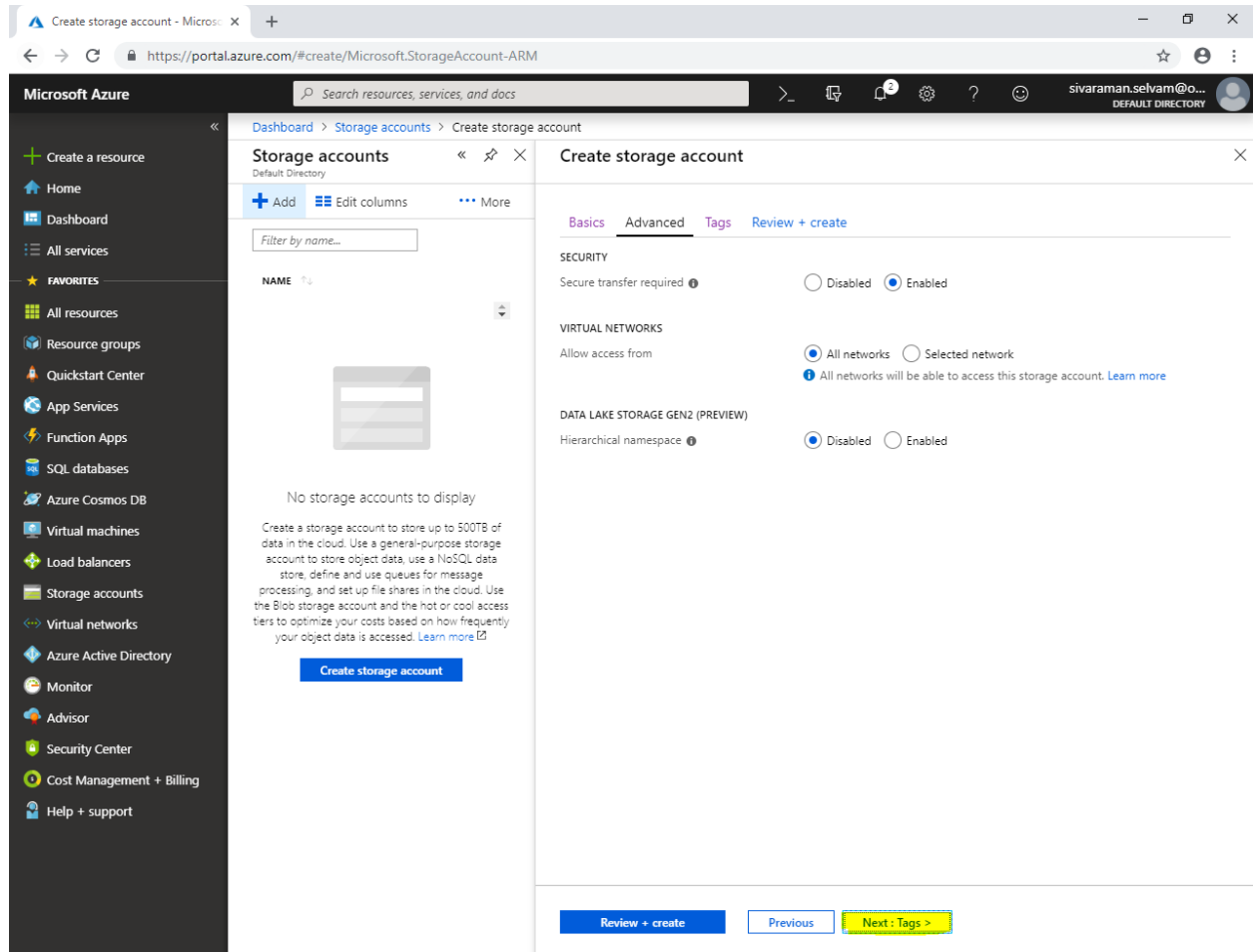
Replication Locally-redundant storage (LRS)

Access tier (default) Cool Hot

Review + create Previous Next : Advanced >

In **“Advanced”**,

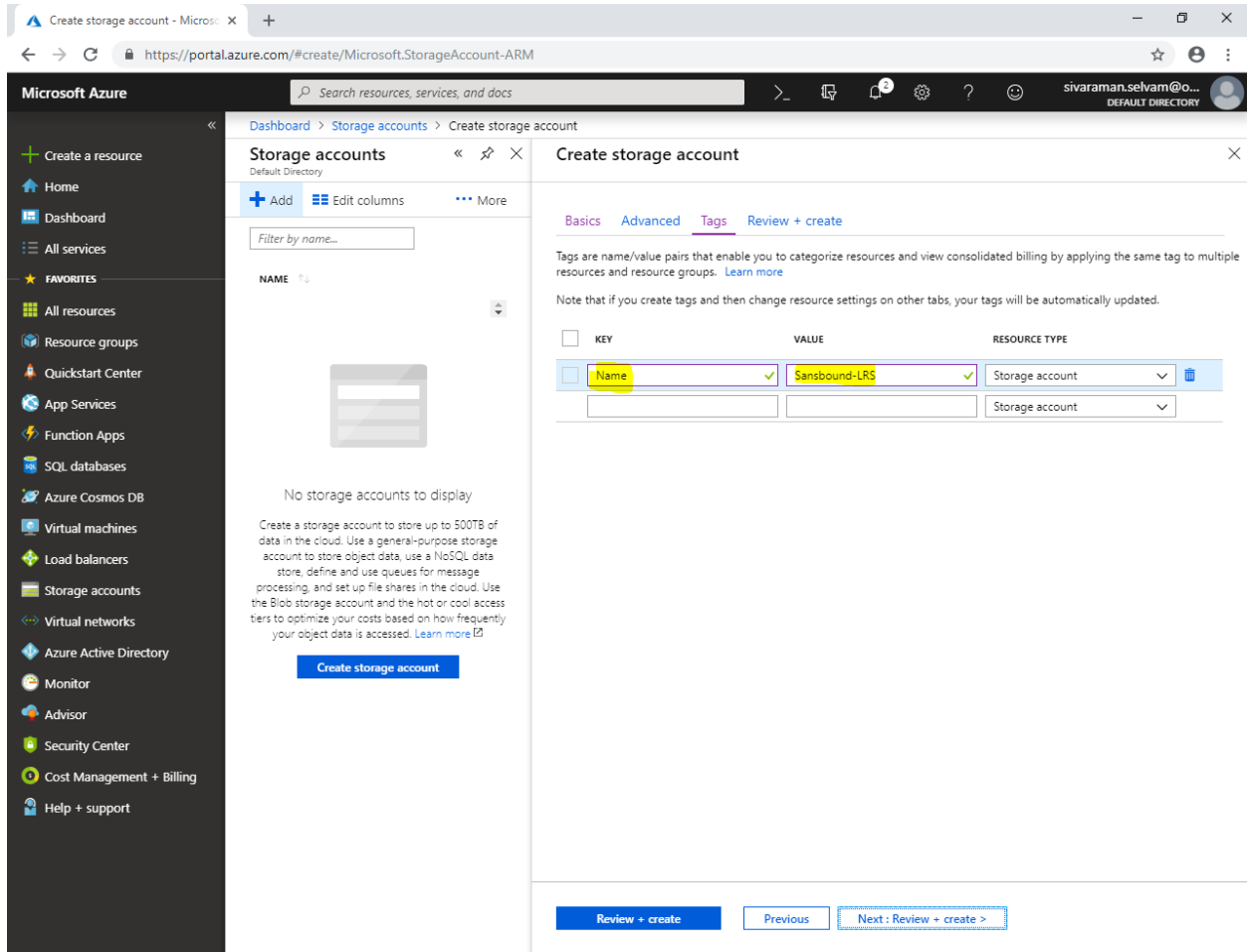
Click **“Next : Tags >”** .



The screenshot shows the Microsoft Azure portal interface for creating a storage account. The left sidebar contains navigation links for various Azure services. The main content area is titled 'Create storage account' and is divided into two panes. The left pane shows a list of storage accounts (currently empty) with a 'Create storage account' button at the bottom. The right pane shows the configuration options for the storage account, organized into tabs: Basics, Advanced, Tags, and Review + create. The 'Advanced' tab is selected, showing settings for SECURITY (Secure transfer required), VIRTUAL NETWORKS (Allow access from), and DATA LAKE STORAGE GEN2 (PREVIEW) (Hierarchical namespace). The 'Next : Tags >' button is highlighted in yellow at the bottom right.

In “Tags”,

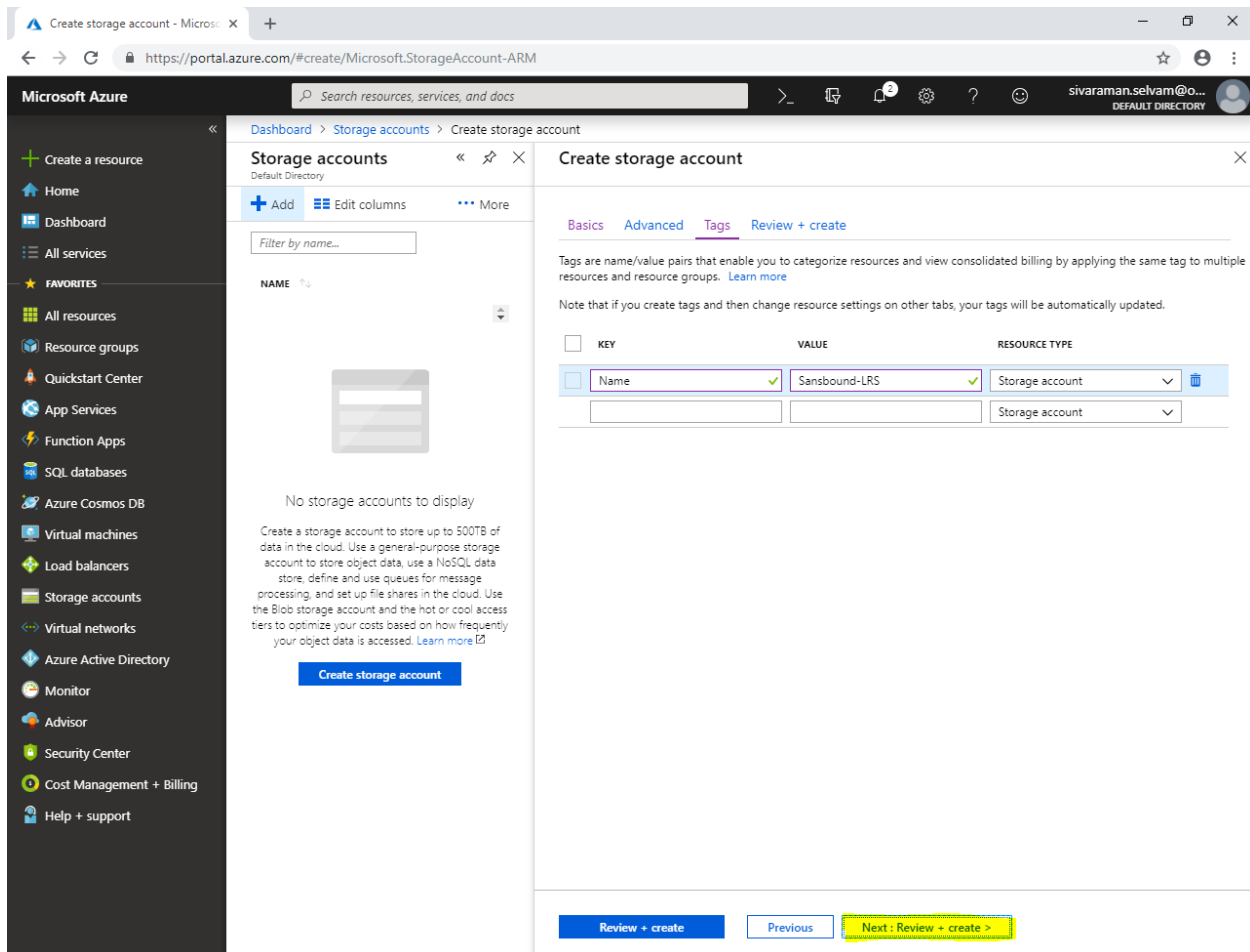
Type “KEY” as “Name” and “VALUE” as “Sansbound-LRS”.



The screenshot shows the Azure portal interface for creating a storage account. The left sidebar contains the navigation menu with options like 'Create a resource', 'Home', 'Dashboard', 'All services', and 'FAVORITES'. The main area is titled 'Storage accounts' and 'Create storage account'. The 'Tags' tab is selected, showing a table for configuring tags. The table has columns for 'KEY', 'VALUE', and 'RESOURCE TYPE'. The first row shows 'Name' as the key and 'Sansbound-LRS' as the value, both with checkmarks indicating they are valid. The 'RESOURCE TYPE' is set to 'Storage account'. Below the table, there are buttons for 'Review + create', 'Previous', and 'Next: Review + create >'. The 'Next: Review + create >' button is highlighted with a dashed border.

KEY	VALUE	RESOURCE TYPE
Name	Sansbound-LRS	Storage account
		Storage account

Click **“Next : Review + create”**.



The screenshot shows the Microsoft Azure portal interface for creating a storage account. The left sidebar contains navigation links for various Azure services. The main content area is titled 'Create storage account' and includes tabs for 'Basics', 'Advanced', 'Tags', and 'Review + create'. The 'Tags' tab is active, displaying a table for adding tags. The table has three columns: KEY, VALUE, and RESOURCE TYPE. One tag is already added: 'Name' with the value 'Sansbound-LRS' and resource type 'Storage account'. Below the table, there is a 'Review + create' button, a 'Previous' button, and a highlighted 'Next : Review + create >' button.

KEY	VALUE	RESOURCE TYPE
Name	Sansbound-LRS	Storage account
		Storage account

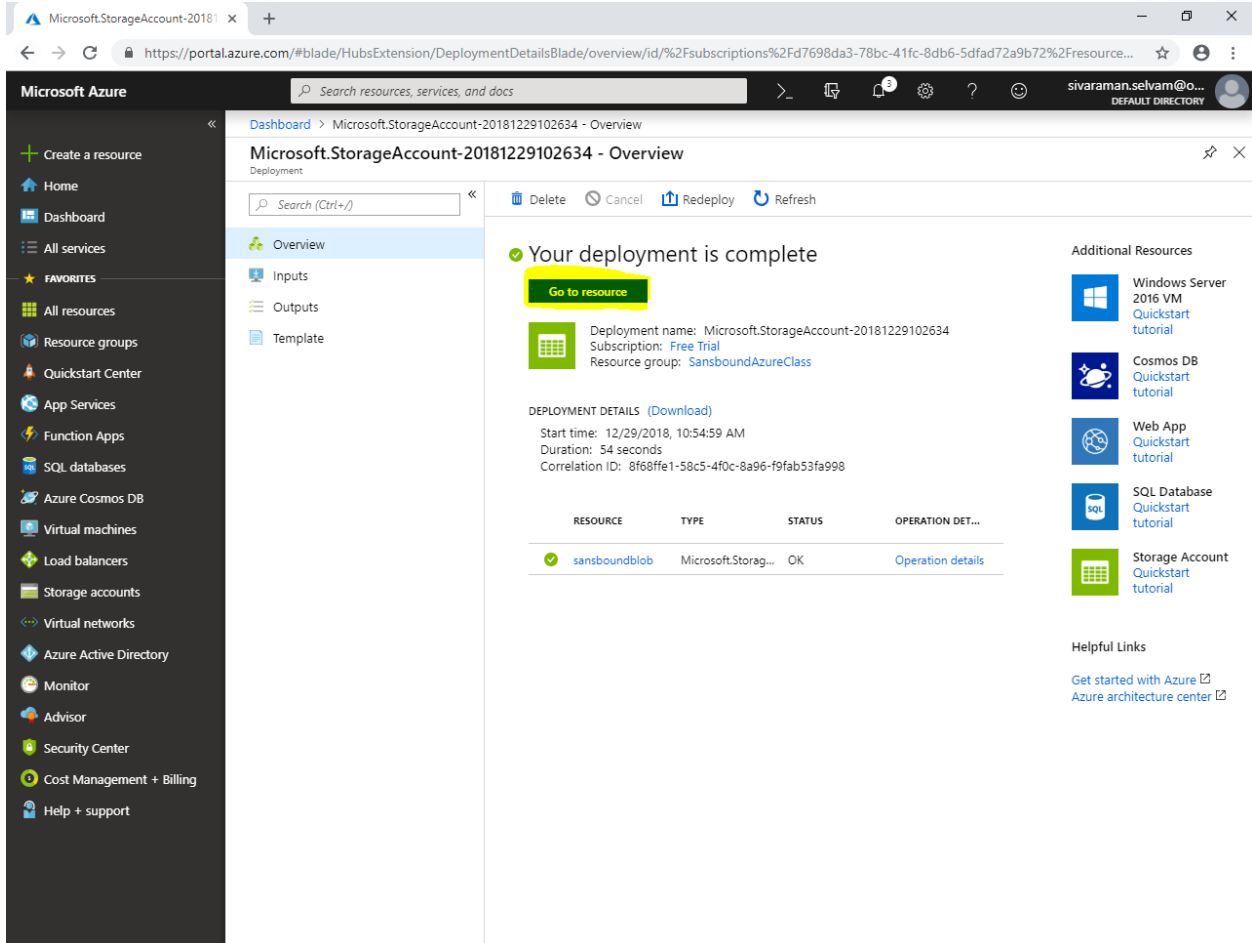
Click **"Create"**.

The screenshot shows the Microsoft Azure portal interface for creating a new storage account. The left sidebar contains navigation links for various Azure services. The main content area is titled 'Create storage account' and shows a 'Validation passed' status. The 'Basics' tab is active, displaying the following configuration details:

Category	Property	Value
BASICS	Subscription	Free Trial
	Resource group	SansboundAzureClass
	Location	Central US
	Storage account name	sansboundblob
	Deployment model	Resource manager
ADVANCED	Account kind	StorageV2 (general purpose v2)
	Replication	Locally-redundant storage (LRS)
	Performance	Standard
	Access tier (default)	Hot
TAGS	Secure transfer required	Enabled
	Allow access from	All networks
	Hierarchical namespace	Disabled
	Name	Sansbound-LRS (Storage account)

At the bottom of the wizard, the 'Create' button is highlighted in yellow, indicating the next step to complete the account creation.

Click **"Go to resource"**.



The screenshot shows the Microsoft Azure portal interface. The left sidebar contains navigation options like 'Create a resource', 'Home', 'Dashboard', 'All services', and 'FAVORITES'. The main content area displays the 'Overview' of a deployment for 'Microsoft.StorageAccount-20181229102634'. A green checkmark indicates 'Your deployment is complete'. A yellow button labeled 'Go to resource' is prominently displayed. Below this, deployment details are listed: Start time (12/29/2018, 10:54:59 AM), Duration (54 seconds), and Correlation ID (8f68ffe1-58c5-4f0c-8a96-f9fab53fa998). A table at the bottom shows the resource 'sansboundblob' with status 'OK'. On the right, there are 'Additional Resources' and 'Helpful Links'.

**Deployment Details:**

- Deployment name: Microsoft.StorageAccount-20181229102634
- Subscription: [Free Trial](#)
- Resource group: [SansboundAzureClass](#)
- Start time: 12/29/2018, 10:54:59 AM
- Duration: 54 seconds
- Correlation ID: 8f68ffe1-58c5-4f0c-8a96-f9fab53fa998

RESOURCE	TYPE	STATUS	OPERATION DET...
✓ sansboundblob	Microsoft.Storage...	OK	<a href="#">Operation details</a>

**Additional Resources:**

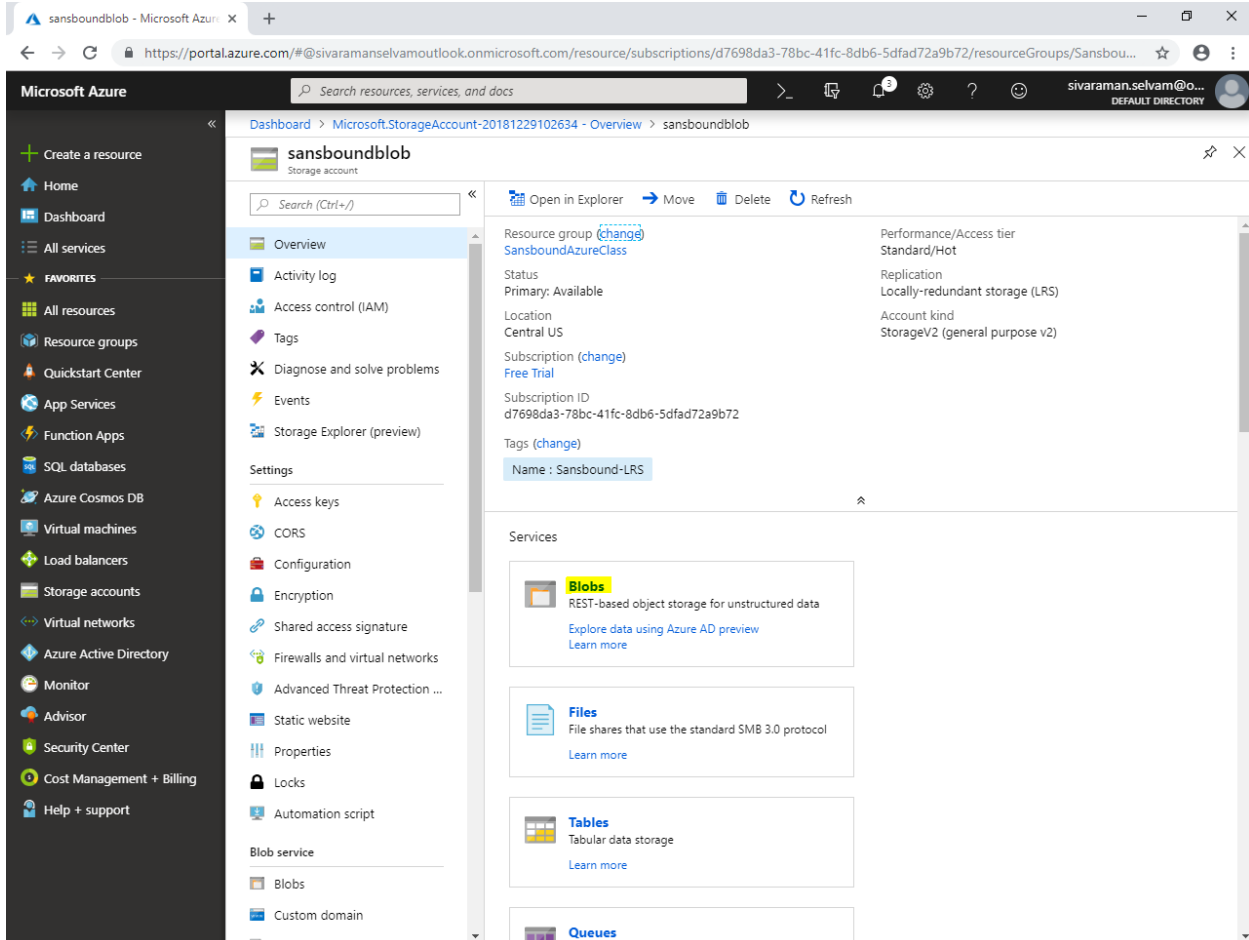
- [Windows Server 2016 VM Quickstart tutorial](#)
- [Cosmos DB Quickstart tutorial](#)
- [Web App Quickstart tutorial](#)
- [SQL Database Quickstart tutorial](#)
- [Storage Account Quickstart tutorial](#)

**Helpful Links:**

- [Get started with Azure](#)
- [Azure architecture center](#)

In “sansboundblob”.

Click “Blobs”.



The screenshot shows the Microsoft Azure portal interface. The top navigation bar includes the 'Microsoft Azure' logo, a search bar, and the user profile 'sivaraman.selvam@o...'. The breadcrumb trail indicates the path: Dashboard > Microsoft.StorageAccount-20181229102634 - Overview > sansboundblob. The main content area displays the 'sansboundblob' storage account overview. On the left, a sidebar lists various Azure services and the 'Overview' tab is selected. The overview page shows the following details:

- Resource group:** [SansboundAzureClass](#)
- Status:** Primary; Available
- Location:** Central US
- Subscription ID:** d7698da3-78bc-41fc-8db6-5dfad72a9b72
- Tags:** [\(change\)](#)
- Name:** Sansbound-LRS
- Performance/Access tier:** Standard/Hot
- Replication:** Locally-redundant storage (LRS)
- Account kind:** StorageV2 (general purpose v2)

Below the overview details, the 'Services' section lists four storage services:

- Blobs:** REST-based object storage for unstructured data. [Explore data using Azure AD preview](#), [Learn more](#)
- Files:** File shares that use the standard SMB 3.0 protocol. [Learn more](#)
- Tables:** Tabular data storage. [Learn more](#)
- Queues:**



In **"Blobs"**.

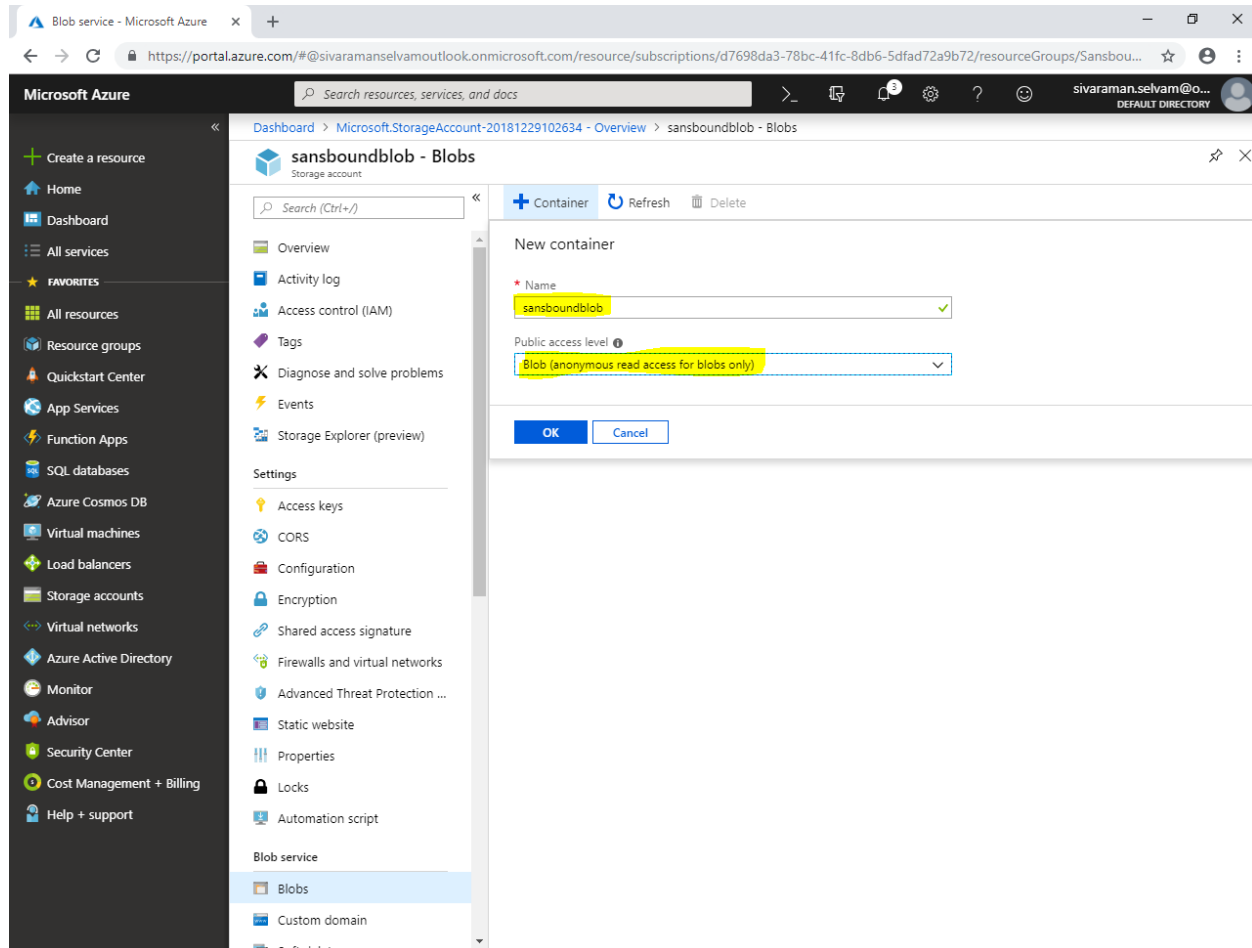
Click **"Container"** to create container.

The screenshot shows the Microsoft Azure portal interface. The left sidebar contains the navigation menu with categories like 'Create a resource', 'Home', 'Dashboard', 'All services', and 'FAVORITES'. The 'Storage accounts' section is expanded, and the 'Blobs' option is selected. The main pane displays the 'sansboundblob - Blobs' page for a storage account. At the top of this pane, there is a '+ Container' button highlighted in yellow, along with 'Refresh' and 'Delete' buttons. Below this, the storage account name 'sansboundblob' is shown. A search bar for containers is present. A table with columns 'NAME', 'LAST MODIFIED', 'PUBLIC ACCESS L...', and 'LEASE STATE' is shown, but it is empty with the message 'You don't have any containers yet. Click '+ Container' to get started.'

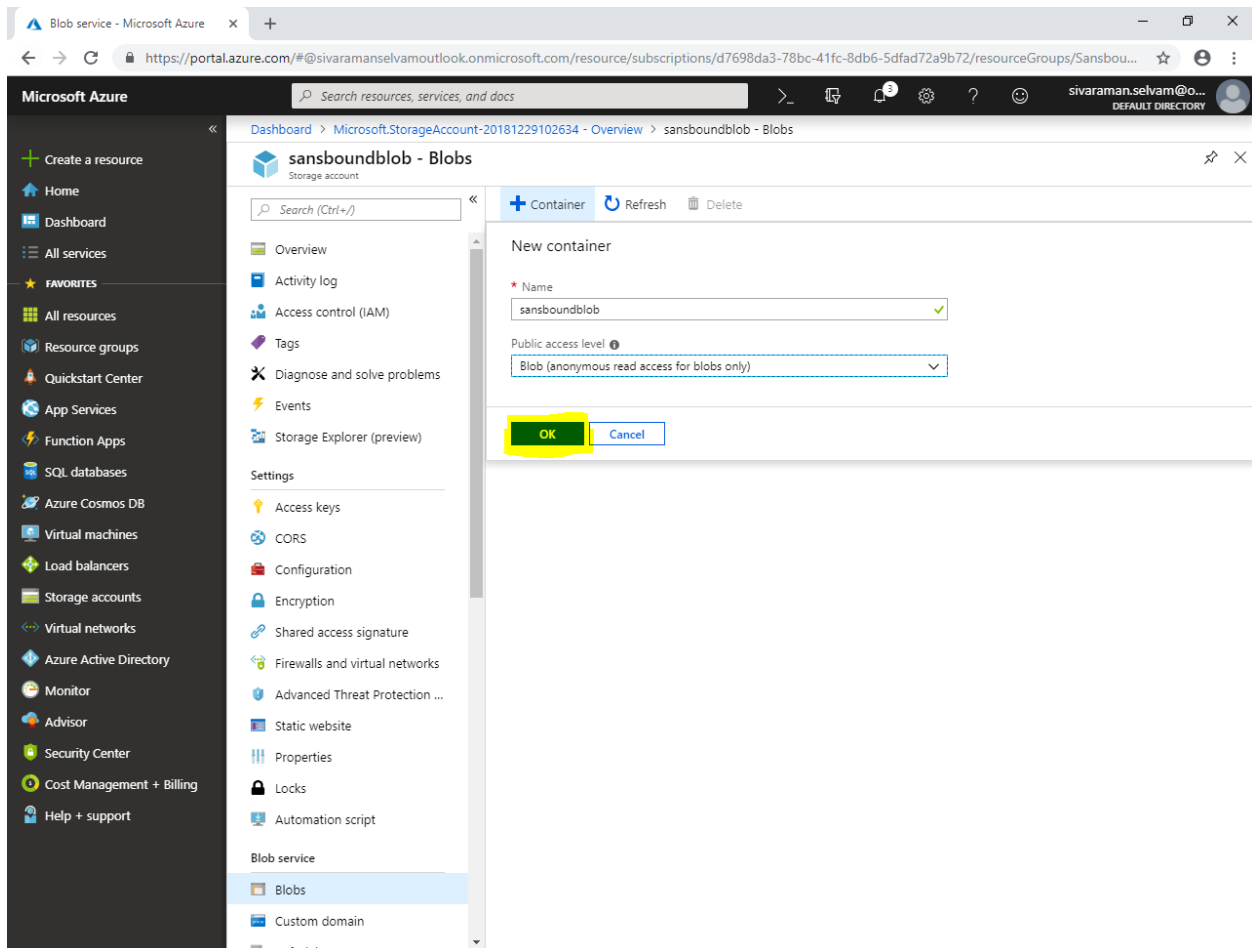
While create new container,

In **"Name"** type name as **"sansboundblob"**.

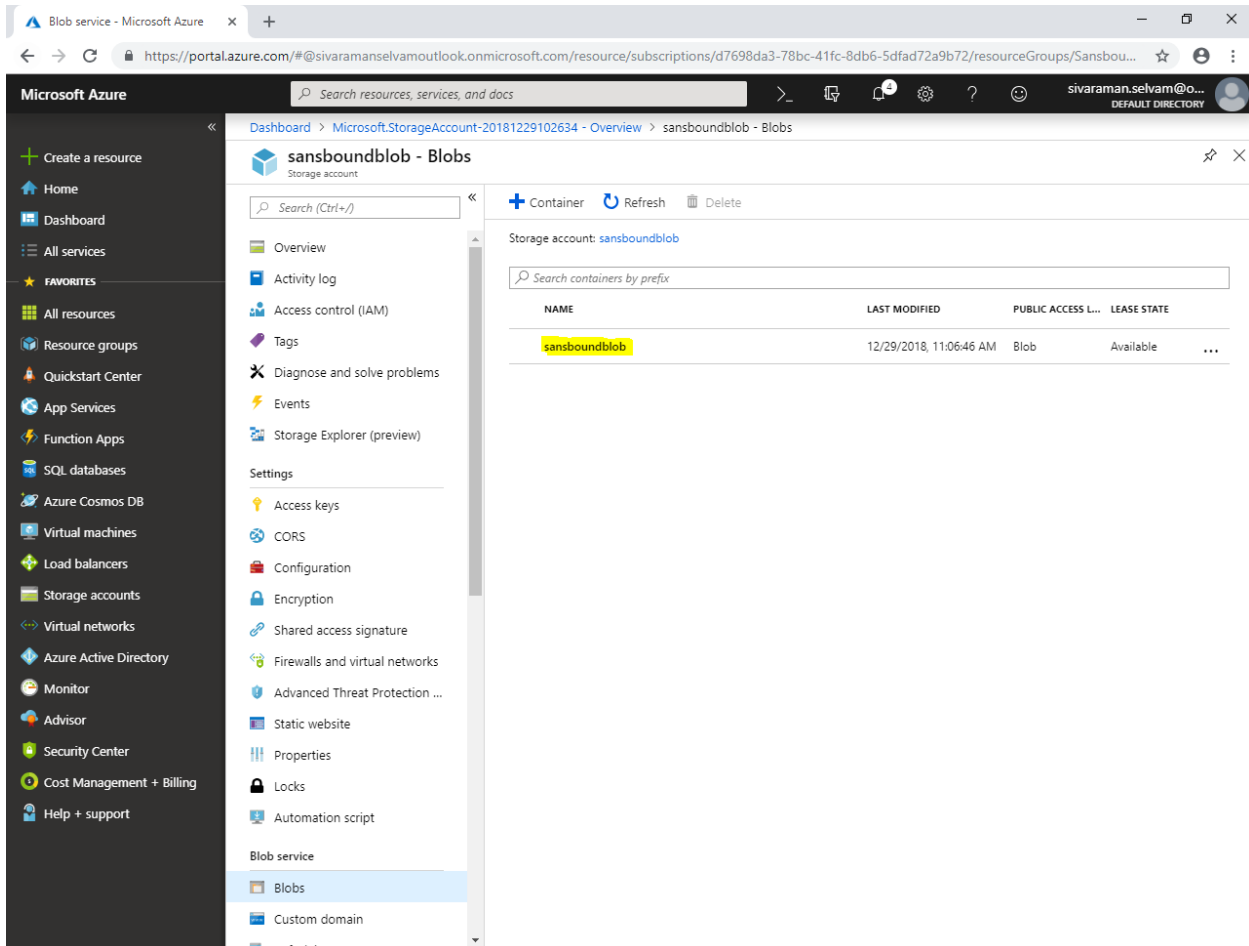
In **"Public access level"** select as **"Blob"**.



Click **"OK"**.



Click container named **"sansboundblob"**.



The screenshot shows the Microsoft Azure portal interface. The left sidebar contains the navigation menu with categories like 'Create a resource', 'Home', 'Dashboard', 'All services', and 'FAVORITES'. The 'Storage accounts' section is expanded, and the 'sansboundblob' storage account is selected. The main pane displays the 'sansboundblob - Blobs' view. At the top, there are buttons for '+ Container', 'Refresh', and 'Delete'. Below this, the storage account name 'sansboundblob' is shown. A search bar 'Search containers by prefix' is present. A table lists the containers, with 'sansboundblob' highlighted. The table has columns for NAME, LAST MODIFIED, PUBLIC ACCESS L..., and LEASE STATE.

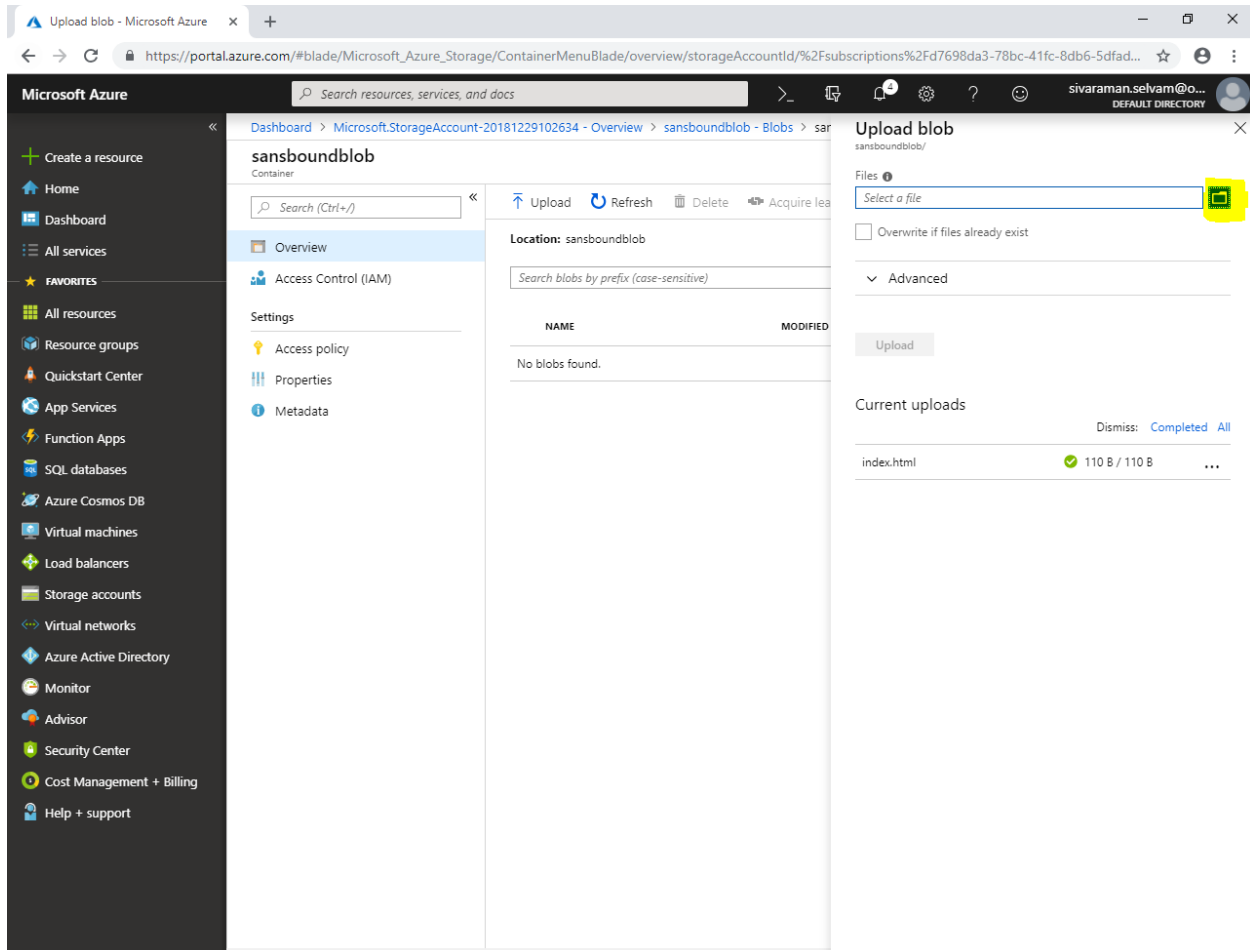
NAME	LAST MODIFIED	PUBLIC ACCESS L...	LEASE STATE
sansboundblob	12/29/2018, 11:06:46 AM	Blob	Available

Click **"Upload"**.

The screenshot shows the Microsoft Azure portal interface. The left sidebar contains the navigation menu with options like 'Create a resource', 'Home', 'Dashboard', 'All services', and 'FAVORITES'. The main content area displays the 'sansboundblob' container overview. The 'Upload' button is highlighted with a yellow box. Below the 'Upload' button, there is a search bar for blobs and a table with columns: NAME, MODIFIED, ACCESS TIER, BLOB TYPE, SIZE, and LEASE STATE. The table currently shows 'No blobs found.'

## In "Upload blob"

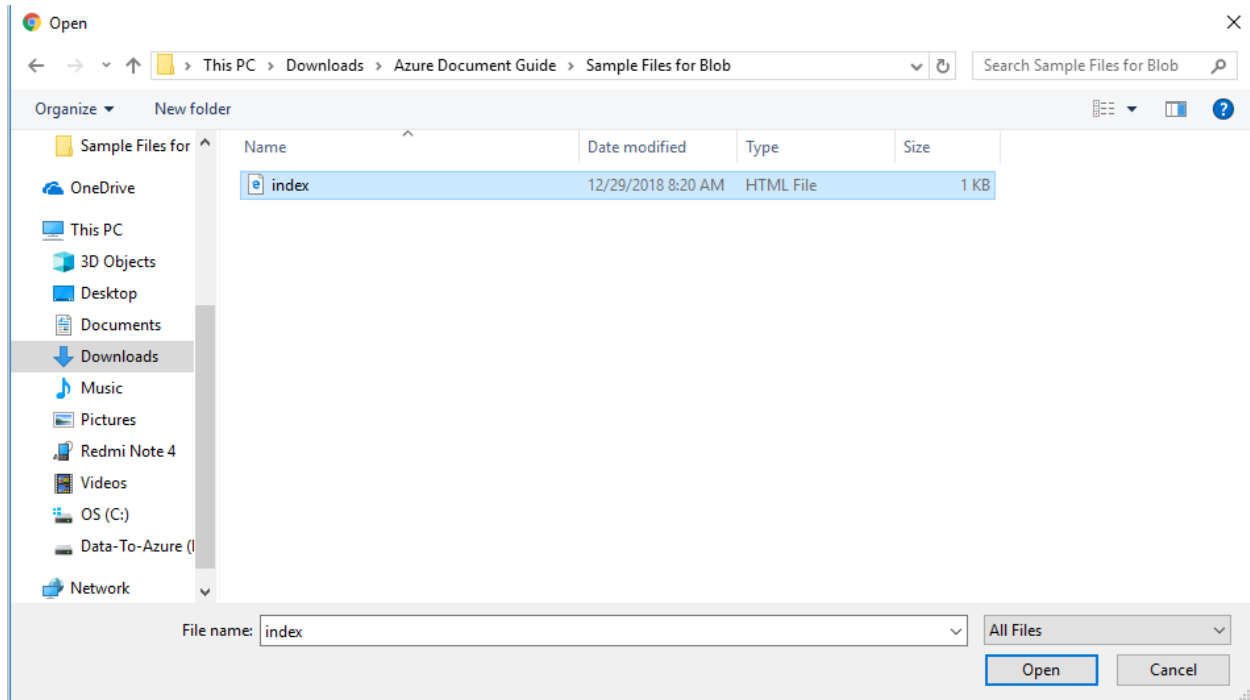
Click "Icon".



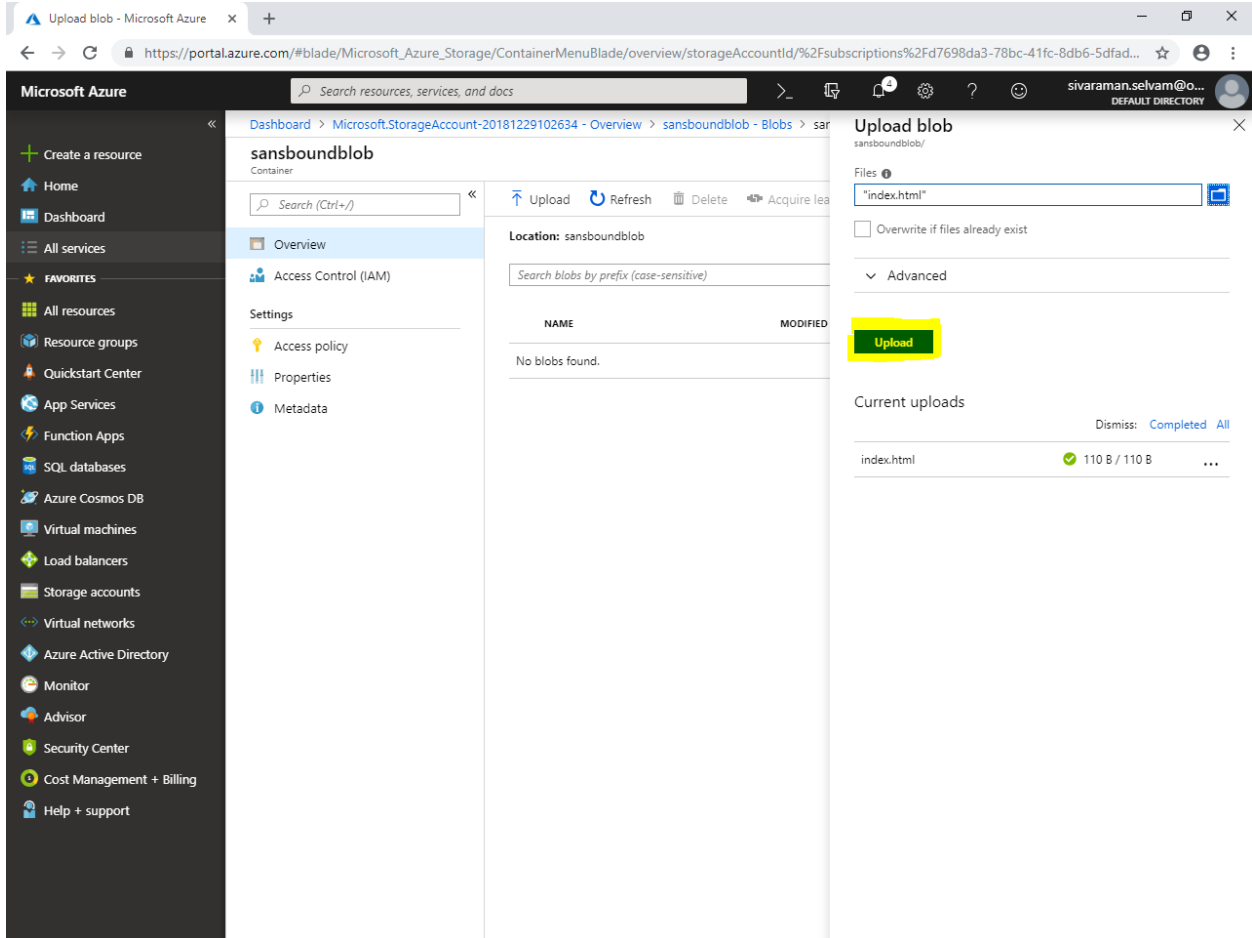
The screenshot shows the Microsoft Azure portal interface. The left sidebar contains the navigation menu with options like 'Create a resource', 'Home', 'Dashboard', 'All services', and 'FAVORITES'. The main area displays the 'sansboundblob' container overview. On the right, the 'Upload blob' pane is open, showing a 'Select a file' button (highlighted with a yellow box), an 'Overwrite if files already exist' checkbox, and an 'Advanced' section. Below these, there is an 'Upload' button and a 'Current uploads' section showing a file named 'index.html' with a status of '110 B / 110 B'.

Locate the path of index.html file where you have stored and select **“index.html”** file.

Click **“Open”**.



Click **“Upload”**.



The screenshot shows the Microsoft Azure portal interface. The left sidebar contains the navigation menu with options like 'Create a resource', 'Home', 'Dashboard', 'All services', and 'FAVORITES'. The main area displays the 'sansboundblob' container overview. On the right, the 'Upload blob' panel is open, showing a file input field with 'index.html' and a green 'Upload' button. Below the upload section, the 'Current uploads' table shows a single entry for 'index.html' with a status of 'Completed' and a size of '110 B / 110 B'.

**Microsoft Azure** | Search resources, services, and docs | sivaraman.selvam@o... | DEFAULT DIRECTORY

Dashboard > Microsoft.StorageAccount-20181229102634 - Overview > sansboundblob - Blobs > sansboundblob

**sansboundblob**  
Container

Search (Ctrl+/)

Overview | Access Control (IAM) | Settings | Access policy | Properties | Metadata

Upload | Refresh | Delete | Acquire lease

Location: sansboundblob

Search blobs by prefix (case-sensitive)

NAME	MODIFIED
No blobs found.	

**Upload blob**  
sansboundblob/

Files

index.html

☐ Overwrite if files already exist

Advanced

**Upload**

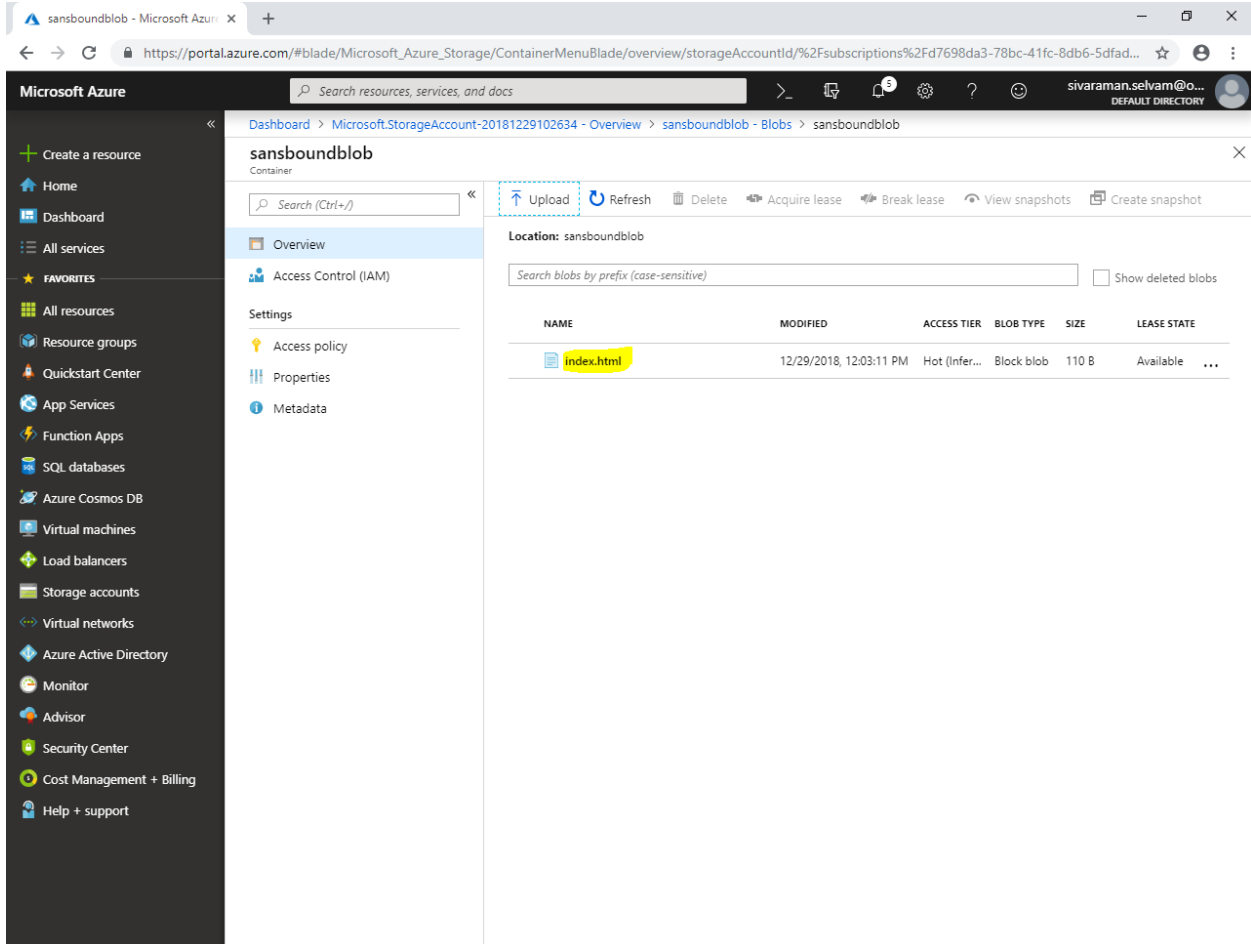
Current uploads

Dismiss: Completed All


index.html	110 B / 110 B	...
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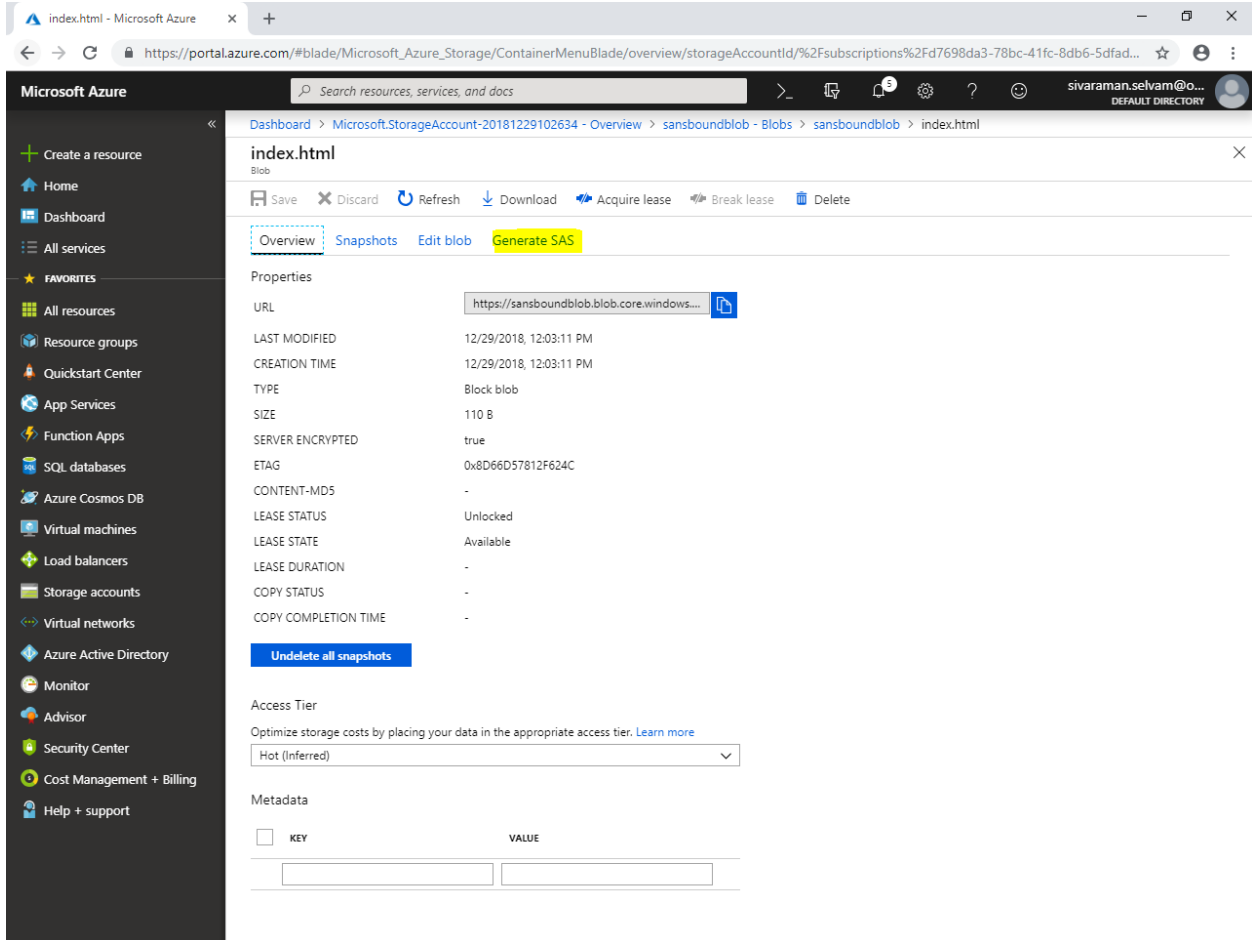
Click **"index.html"**.



The screenshot shows the Microsoft Azure portal interface. The left sidebar contains navigation options like 'Create a resource', 'Home', 'Dashboard', 'All services', and 'FAVORITES'. The main area displays the 'sansboundblob' container overview. A search bar is present, and a table lists the blobs. The 'index.html' blob is highlighted.

NAME	MODIFIED	ACCESS TIER	BLOB TYPE	SIZE	LEASE STATE
 index.html	12/29/2018, 12:03:11 PM	Hot (Infer...	Block blob	110 B	Available ...

Click **“Generate SAS”**.



The screenshot shows the Microsoft Azure portal interface. The left sidebar contains navigation options like 'Create a resource', 'Home', 'Dashboard', 'All services', and 'FAVORITES'. The main content area displays the 'index.html' blob page. The 'Generate SAS' button is highlighted in yellow. The page also shows properties for the blob, including URL, last modified time, creation time, type, size, server encrypted status, etag, content-md5, lease status, lease state, lease duration, copy status, and copy completion time. The 'Access Tier' is set to 'Hot (Inferred)'.

index.html - Microsoft Azure

Search resources, services, and docs

Dashboard > Microsoft.StorageAccount-20181229102634 - Overview > sansboundblob - Blobs > sansboundblob > index.html

index.html

Save Discard Refresh Download Acquire lease Break lease Delete

Overview Snapshots Edit blob **Generate SAS**

Properties

URL <https://sansboundblob.blob.core.windows...>

LAST MODIFIED 12/29/2018, 12:03:11 PM

CREATION TIME 12/29/2018, 12:03:11 PM

TYPE Block blob

SIZE 110 B

SERVER ENCRYPTED true

ETAG 0x8D66D57812F624C

CONTENT-MD5 -

LEASE STATUS Unlocked

LEASE STATE Available

LEASE DURATION -

COPY STATUS -

COPY COMPLETION TIME -

Undelete all snapshots

Access Tier

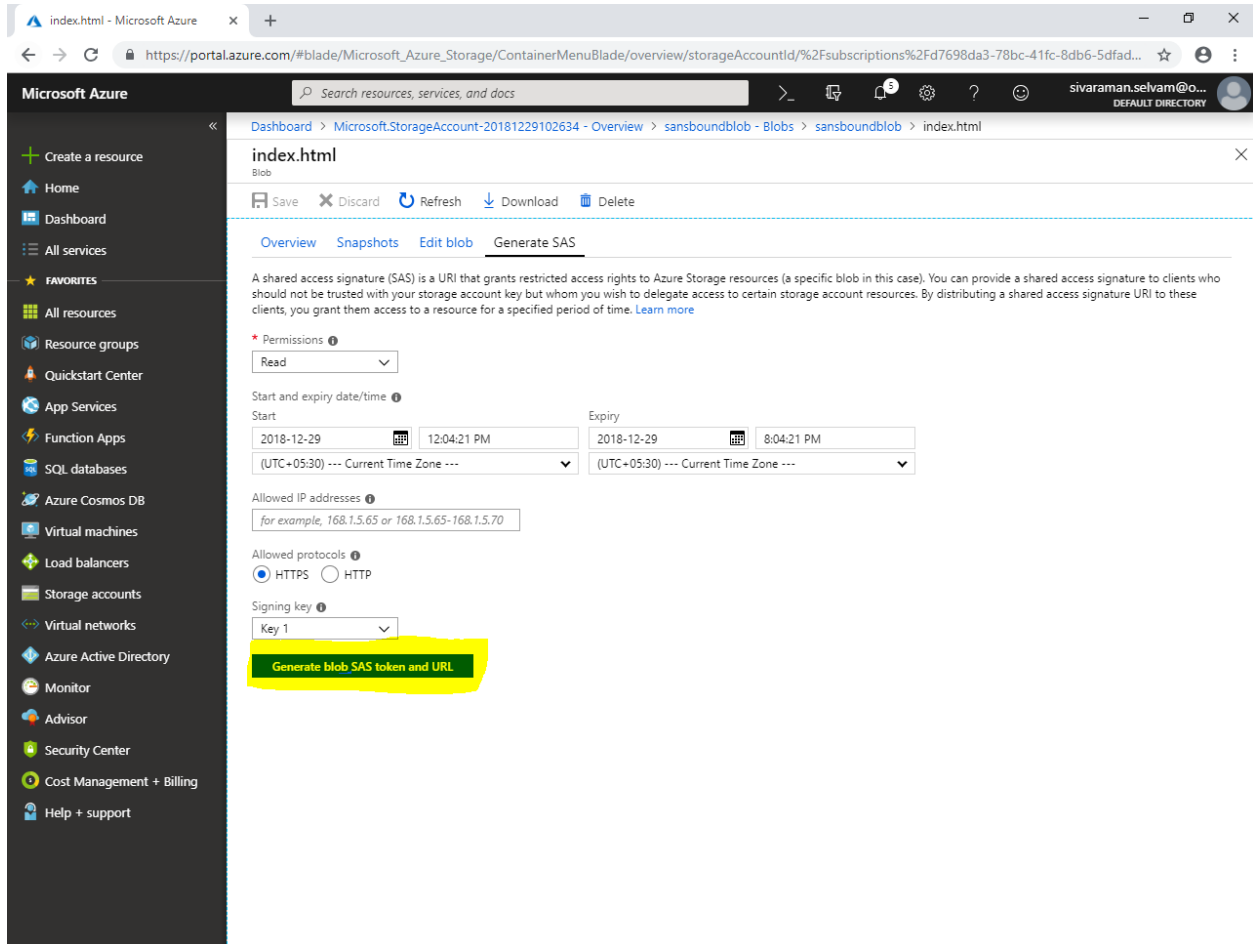
Optimize storage costs by placing your data in the appropriate access tier. [Learn more](#)

Hot (Inferred)

Metadata

KEY	VALUE

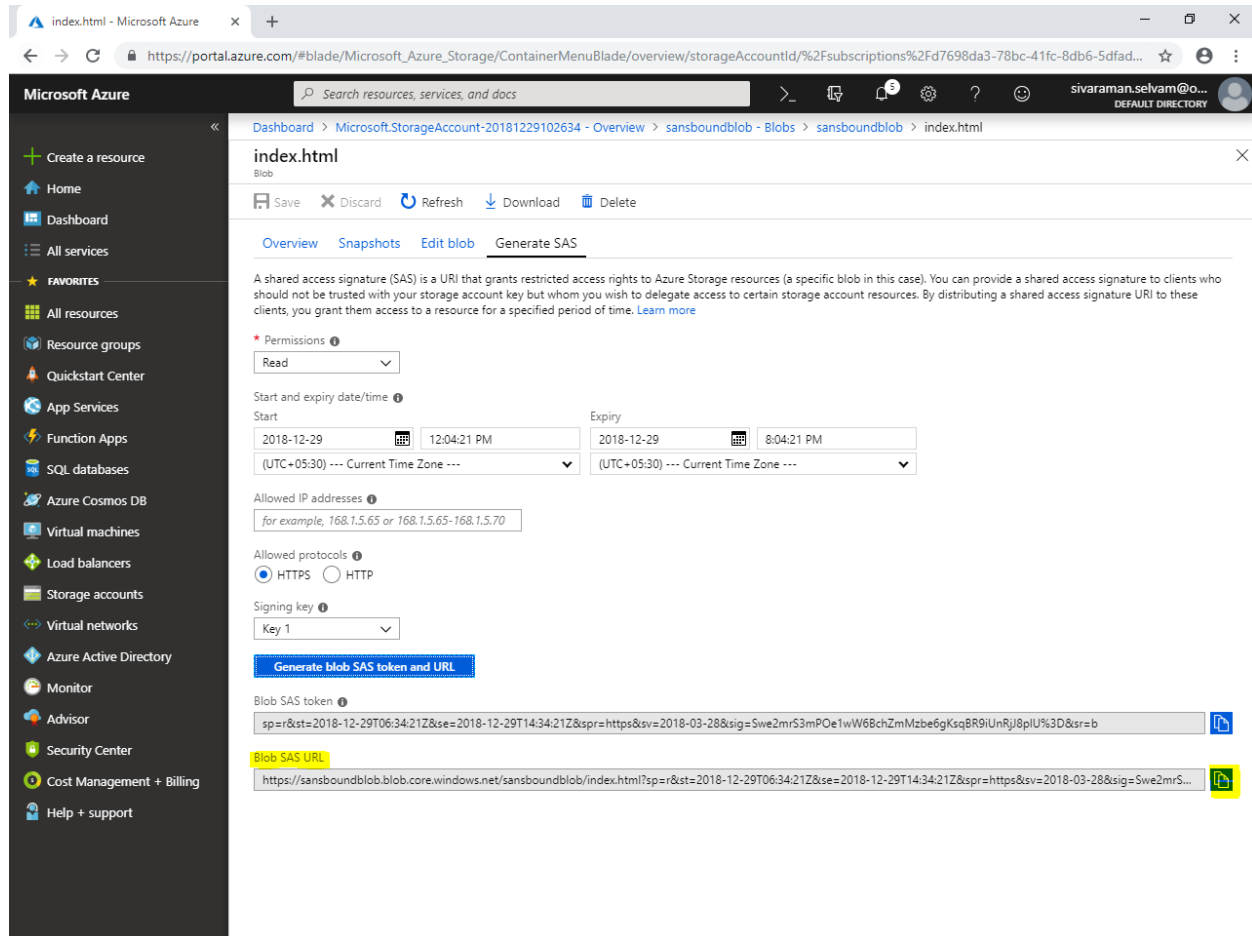
Click **“Generate blob SAS token and URL”**.



The screenshot shows the Microsoft Azure portal interface. The left sidebar contains navigation links for 'Create a resource', 'Home', 'Dashboard', 'All services', and 'FAVORITES'. The main content area displays the 'index.html' blob page with tabs for 'Overview', 'Snapshots', 'Edit blob', and 'Generate SAS'. The 'Generate SAS' tab is active, showing a description of Shared Access Signatures (SAS) and a form to generate one. The form includes fields for 'Permissions' (set to 'Read'), 'Start and expiry date/time' (Start: 2018-12-29 12:04:21 PM, Expiry: 2018-12-29 8:04:21 PM), 'Allowed IP addresses' (with an example), 'Allowed protocols' (HTTPS selected), and 'Signing key' (Key 1). A yellow box highlights the 'Generate blob SAS token and URL' button at the bottom of the form.

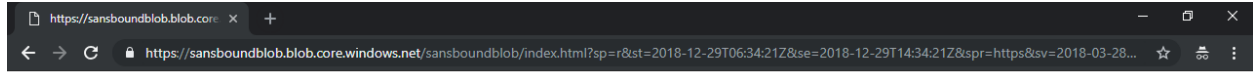
## In "Blob SAS URL"

Click **"Icon"** to copy Blob SAS URL path.



The screenshot shows the Microsoft Azure portal interface. The left sidebar contains navigation options like 'Create a resource', 'Home', 'Dashboard', 'All services', and 'FAVORITES'. The main content area displays the 'index.html' blob page. The 'Generate SAS' tab is active, showing a form to generate a shared access signature (SAS). The form includes fields for 'Permissions' (set to 'Read'), 'Start' and 'Expiry' dates/times, 'Allowed IP addresses', 'Allowed protocols' (HTTPS selected), and 'Signing key' (Key 1). A blue button labeled 'Generate blob SAS token and URL' is visible. Below the form, the 'Blob SAS token' and 'Blob SAS URL' are displayed. The 'Blob SAS URL' is highlighted with a yellow box, and a copy icon (two overlapping squares) is shown to its right.

Paste "Blob URL" in browser and press "Enter"



**Welcome to Sansbound Azure Blob page**

Note: Your data has been stored in same region in same availability zone in different storage nodes. If primary node failed, then you can able to access data from Secondary node.