# Optimized Hosting of JavaScript Applications (React & Angular) on Azure Blob Storage through GitHub Actions

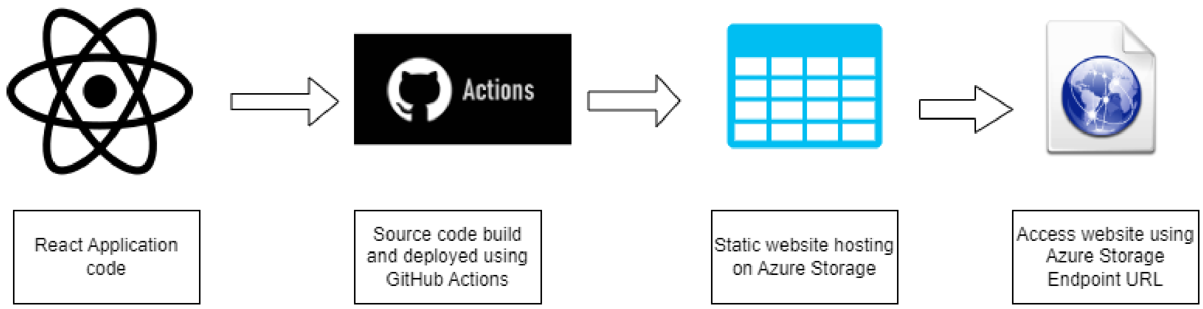
## Problem Statement :

Hosting React ,Angular and Other JS application directly from GitHub Repository to Azure Storage account rather than hosting on virtual machine and Azure App service for cost optimization, reduced latency and building and deployment dependencies.

## Introduction:

JavaScript is called as language of Internet and  React JS is one of the popular front-end framework used of JS used for fast and responsive website designing.To build and host React Application it requires lot of dependencies at your local system as well as on server to host it on.Then comes the Azure Storage static website hosting feature and GitHub Actions open source capabilities of CD to the rescue. Below article is all about how we can achieve the hosting of React Application in simple 4-step solution.

## Solution Architecture:-


Actions
React Application code
Source code build and deployed using GitHub Actions
Static website hosting on Azure Storage
Access website using Azure Storage Endpoint URL

## Technical Implementation

Pre-requisites :

- The latest versions of Node.js & npm or yarn package manager on system
- Azure account & subscription
- Git installed on your system
- GitHub account

**Step 1:- Creating a simple React application and pushing code to GitHub Repository.**

- Choose a suitable working folder and then execute the following command in a terminal window to create a ReactJS app named Sample-React-App.

```
npx create-react-app Sample-React-App --use-npm
cd Sample-React-App
npm start
```

- Create a local git repo by running the following command in the root of your application:

```
git init
git add .
git commit -m "Sample React App
```

- Login into your github account and create a repository with any name you prefer in my case I have created Sample-React-App

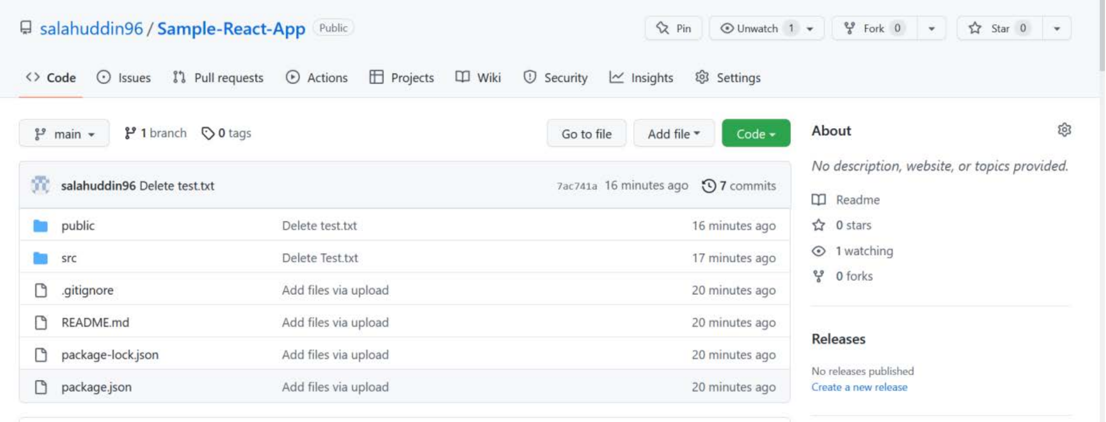
```
git remote add origin https://github.com/salahuddin96/Sample-
React-App.git
git branch -M main
git push -u origin main
```

**Note:** Your application already contains a **.gitignore** file. Node_modules folder will be excluded to pushed to GitHub repo.

**OR**

You can directly fork the code from my GitHub repository given below

https://github.com/salahuddin96/Sample-React-App

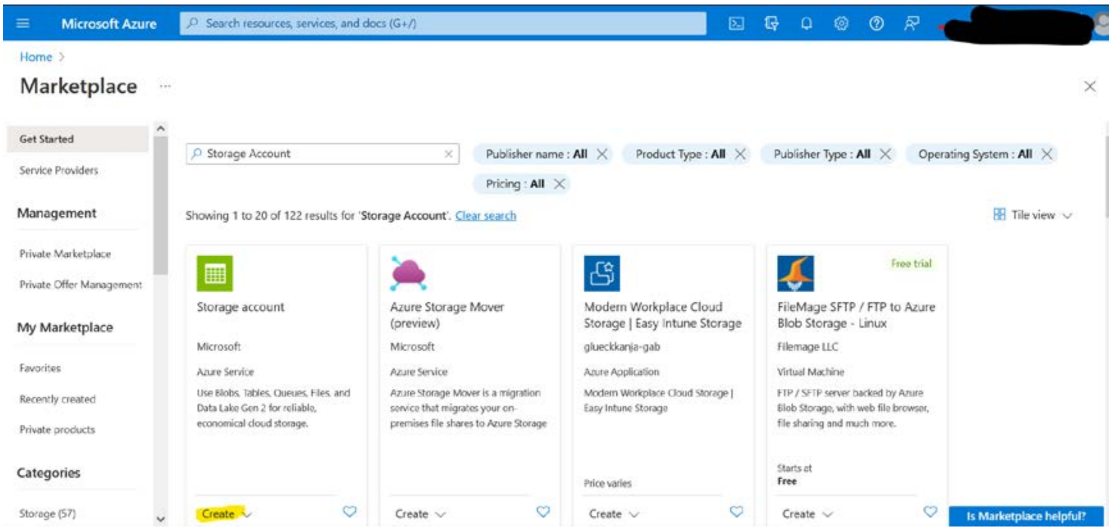


salahuddin96 Delete test.txt 7ac741a 16 minutes ago 7 commits

| | | |
|---|---|---|
| public | Delete test.txt | 16 minutes ago |
| src | Delete Test.txt | 17 minutes ago |
| .gitignore | Add files via upload | 20 minutes ago |
| README.md | Add files via upload | 20 minutes ago |
| package-lock.json | Add files via upload | 20 minutes ago |
| package.json | Add files via upload | 20 minutes ago |

## Step 2:- Create Storage Account on Azure

- Open **https://portal.azure.com** and login into your Azure Account click on "Create a resource".
- In the search field type "Storage account" and click on create.



Microsoft Azure | Search resources, services, and docs (G+/) | [redacted]

Home >

Marketplace ...

Get Started
Service Providers

Management
Private Marketplace
Private Offer Management

My Marketplace
Favorites
Recently created
Private products

Categories
Storage (57)

Storage Account

Publisher name : **All** | Product Type : **All** | Publisher Type : **All** | Operating System : **All** | Pricing : **All**

Showing 1 to 20 of 122 results for '**Storage Account**'. Clear search

Tile view

Storage account
Microsoft
Azure Service
Use Blobs, Tables, Queues, Files, and Data Lake Gen 2 for reliable, economical cloud storage.
Create

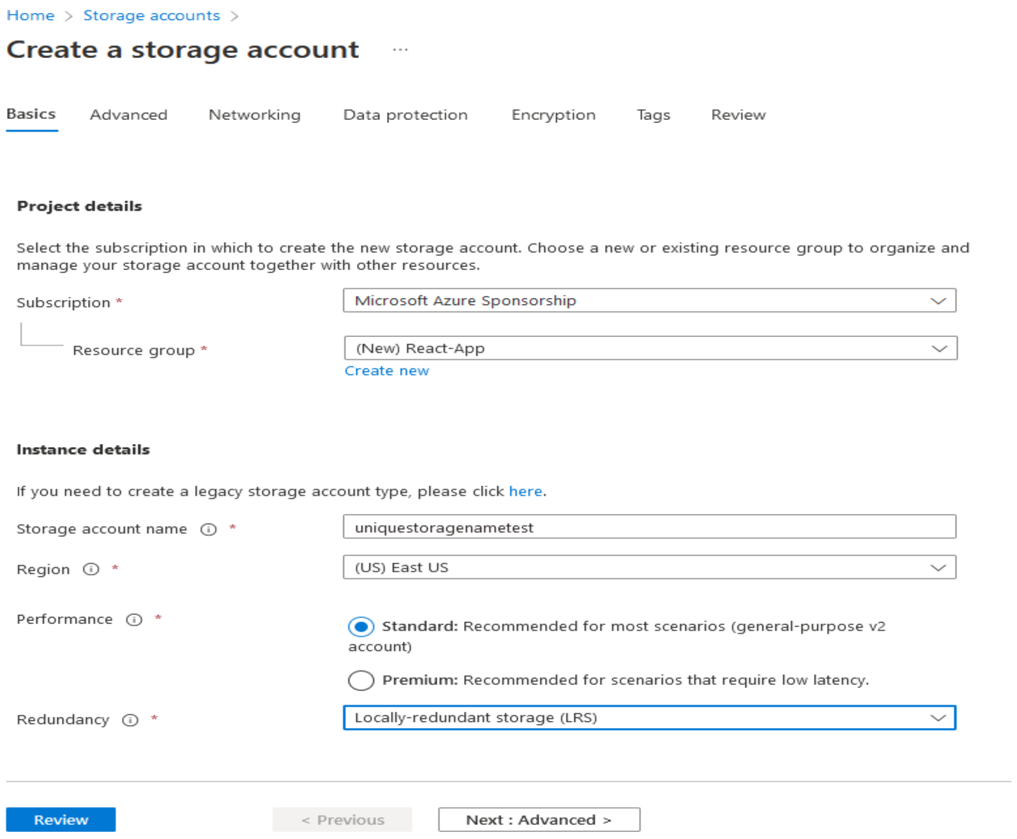
Azure Storage Mover (preview)
Microsoft
Azure Service
Azure Storage Mover is a migration service that migrates your on-premises file shares to Azure Storage
Create

Modern Workplace Cloud Storage | Easy Intune Storage
glueckkanja-gab
Azure Application
Modern Workplace Cloud Storage | Easy Intune Storage
Price varies
Create

Free trial
FileMage SFTP / FTP to Azure Blob Storage - Linux
Filemage LLC
Virtual Machine
FTP / SFTP server backed by Azure Blob Storage, with web file browser, file sharing and much more.
Starts at
**Free**
Create

Is Marketplace helpful?

- Select Proper Subscription and create new resource group and give a suitable unique name and leave all the setting as it is or you can change the region and redundancy as per your requirement.
- On the **Basics tab,** provide the essential information for your storage account. After you complete the Basics tab, you can choose to further customize your new storage account by setting options on the other tabs, or you can select Review + create to accept the default options and proceed to validate and create the account.
- On the **Advanced** tab, you can configure additional options and modify default settings for your new storage account. Some of these options can also be configured after the storage account is created, while others must be configured at the time of creation.



Home > Storage accounts >

Create a storage account ...

Basics | Advanced | Networking | Data protection | Encryption | Tags | Review

**Project details**

Select the subscription in which to create the new storage account. Choose a new or existing resource group to organize and manage your storage account together with other resources.

Subscription * : Microsoft Azure Sponsorship

Resource group * : (New) React-App
Create new

**Instance details**

If you need to create a legacy storage account type, please click here.

Storage account name * : uniquestoragenametest

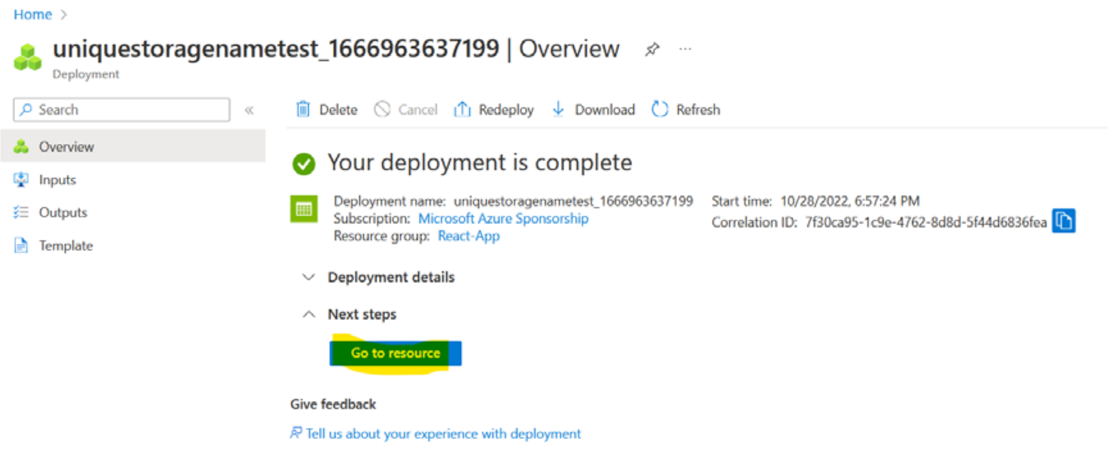
Region * : (US) East US

Performance * :
● **Standard:** Recommended for most scenarios (general-purpose v2 account)
○ **Premium:** Recommended for scenarios that require low latency.

Redundancy * : Locally-redundant storage (LRS)

- Click on "Review + create":

Note :



Home >

uniquestoragenametest_1666963637199 | Overview

Deployment

Your deployment is complete

Deployment name: uniquestoragenametest_1666963637199
Subscription: Microsoft Azure Sponsorship
Resource group: React-App

Start time: 10/28/2022, 6:57:24 PM
Correlation ID: 7f30ca95-1c9e-4762-8d8d-5f44d6836fea

Deployment details

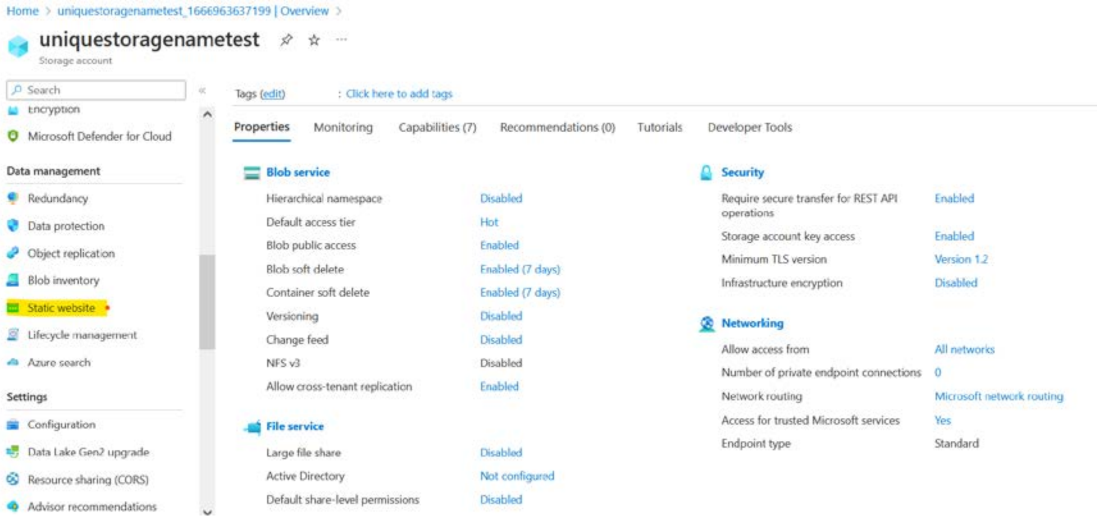
Next steps

Go to resource

Give feedback

Tell us about your experience with deployment

- Once created click on Go to resource and open the storage account .
- On the left side of the option go to Static website under Data Management.



Home > uniquestoragenametest_1666963637199 | Overview >

uniquestoragenametest

Storage account

Blob service

| | |
|---|---|
| Hierarchical namespace | Disabled |
| Default access tier | Hot |
| Blob public access | Enabled |
| Blob soft delete | Enabled (7 days) |
| Container soft delete | Enabled (7 days) |
| Versioning | Disabled |
| Change feed | Disabled |
| NFS v3 | Disabled |
| Allow cross-tenant replication | Enabled |

File service

| | |
|---|---|
| Large file share | Disabled |
| Active Directory | Not configured |
| Default share-level permissions | Disabled |

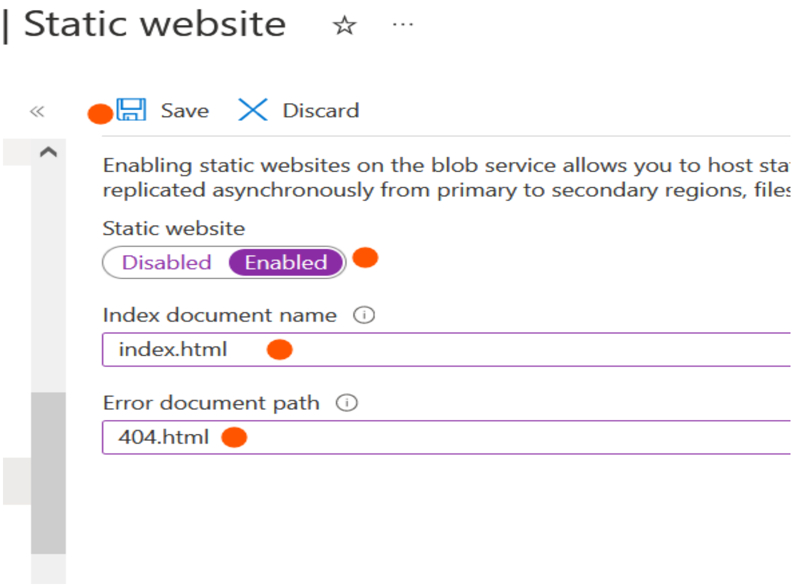
Security

| | |
|---|---|
| Require secure transfer for REST API operations | Enabled |
| Storage account key access | Enabled |
| Minimum TLS version | Version 1.2 |
| Infrastructure encryption | Disabled |

Networking

| | |
|---|---|
| Allow access from | All networks |
| Number of private endpoint connections | 0 |
| Network routing | Microsoft network routing |
| Access for trusted Microsoft services | Yes |
| Endpoint type | Standard |

- Enable the Static website option and add **index.html** in index document name and **404.html** in Error document path and save it.



| Static website ☆ ···

Enabling static websites on the blob service allows you to host sta
replicated asynchronously from primary to secondary regions, files

Static website

Disabled **Enabled**

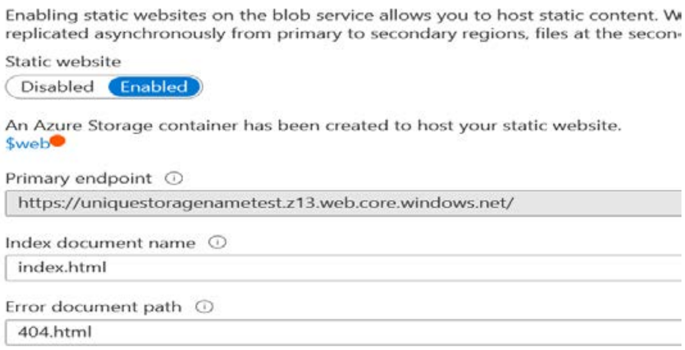
Index document name ⓘ

index.html

Error document path ⓘ

404.html

- Your static website will be placed into a folder named **$web**



Enabling static websites on the blob service allows you to host static content. W
replicated asynchronously from primary to secondary regions, files at the secon

Static website

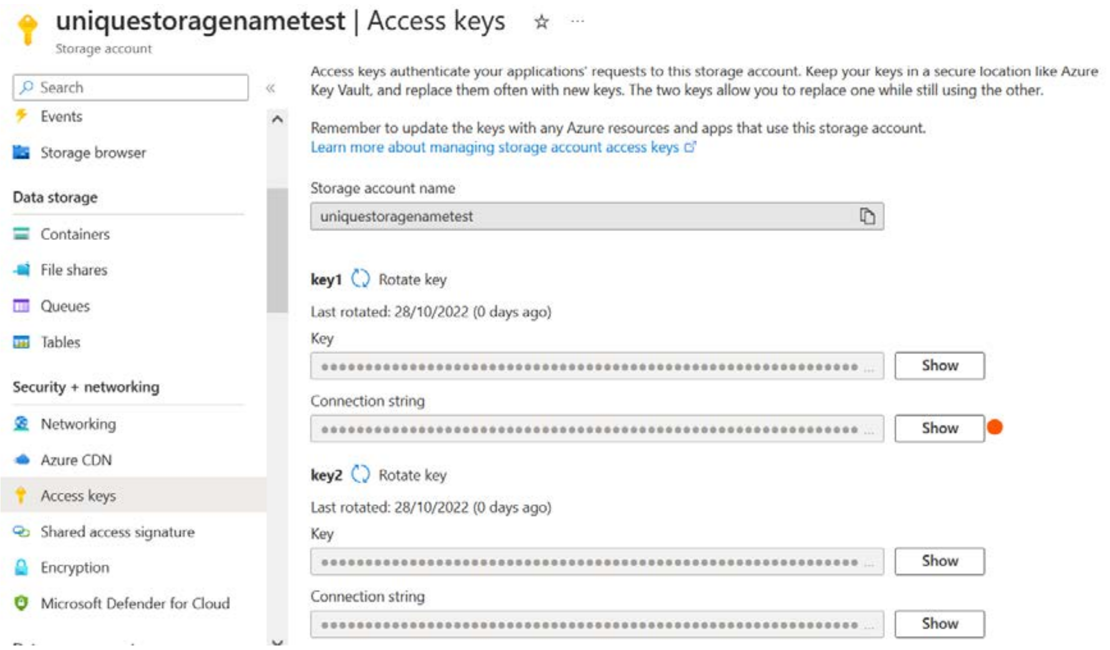
An Azure Storage container has been created to host your static website.
$web

Primary endpoint: https://uniquestoragenametest.z13.web.core.windows.net/

Index document name: index.html

Error document path: 404.html

- Go to Access keys option under **Security + Networking** on the left and click on Show for Connection string and save it on notepad.



uniquestoragenametest | Access keys

Storage account

Access keys authenticate your applications' requests to this storage account. Keep your keys in a secure location like Azure Key Vault, and replace them often with new keys. The two keys allow you to replace one while still using the other.

Remember to update the keys with any Azure resources and apps that use this storage account.
Learn more about managing storage account access keys

Storage account name: uniquestoragenametest

key1 Rotate key

Last rotated: 28/10/2022 (0 days ago)

Key: •••••••••••••••••••••••••••••••••••••••••••••••••••••••••••• Show

Connection string: •••••••••••••••••••••••••••••••••••••••••••••••••••••••••••• Show

key2 Rotate key

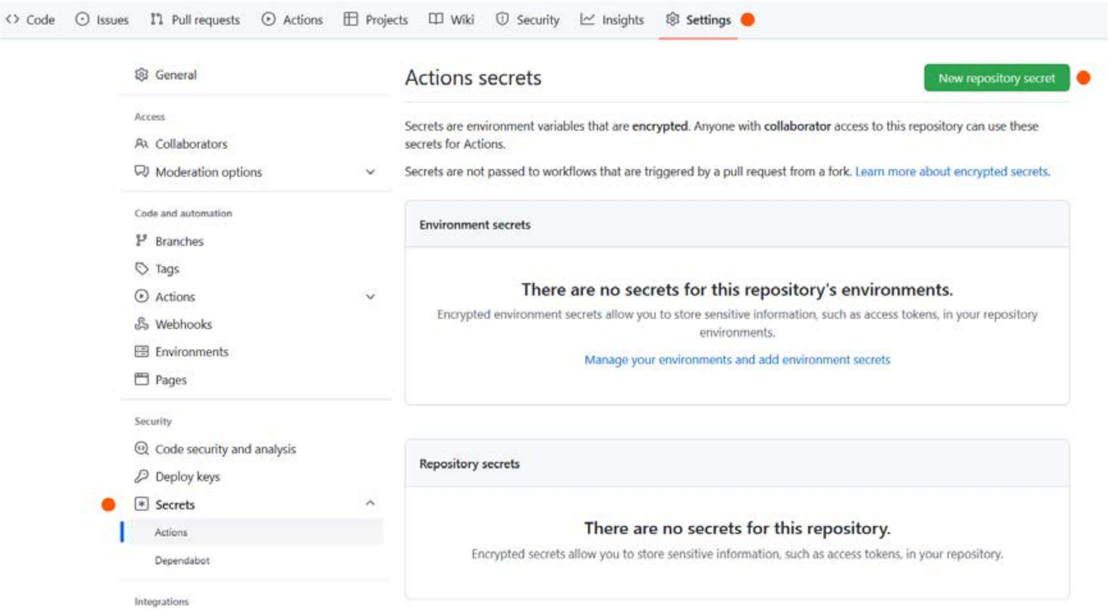
Last rotated: 28/10/2022 (0 days ago)

Key: •••••••••••••••••••••••••••••••••••••••••••••••••••••••••••• Show

Connection string: •••••••••••••••••••••••••••••••••••••••••••••••••••••••••••• Show

## Step 3:- Add the Keys into GitHub for GitHub Action deployment.

- Go to Sample-React-App Repository on GitHub and Click on **Settings >> Secrets >> Actions**



Actions secrets

Secrets are environment variables that are **encrypted**. Anyone with **collaborator** access to this repository can use these secrets for Actions.

Secrets are not passed to workflows that are triggered by a pull request from a fork. Learn more about encrypted secrets.

Environment secrets

There are no secrets for this repository's environments.

Encrypted environment secrets allow you to store sensitive information, such as access tokens, in your repository environments.

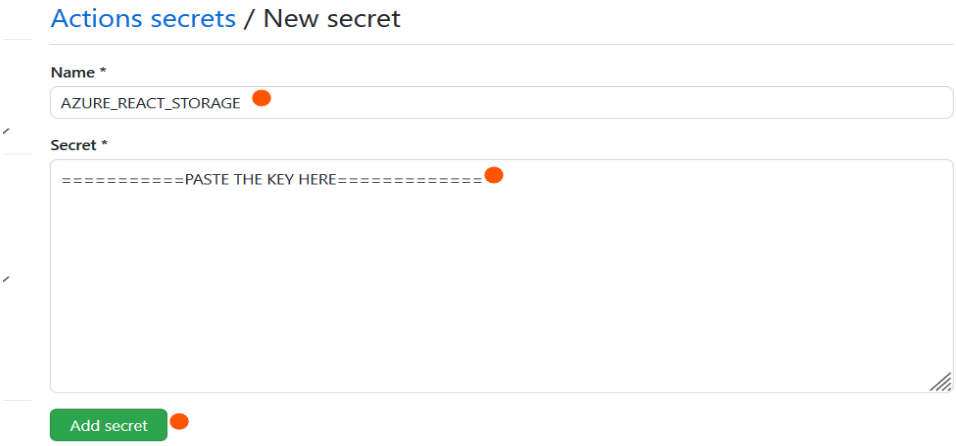
Manage your environments and add environment secrets

Repository secrets

There are no secrets for this repository.

Encrypted secrets allow you to store sensitive information, such as access tokens, in your repository.

- Create a key named **AZURE_REACT_STORAGE** then paste the key that you previously saved in a Notepad and click on "Add secret".



Actions secrets / New secret

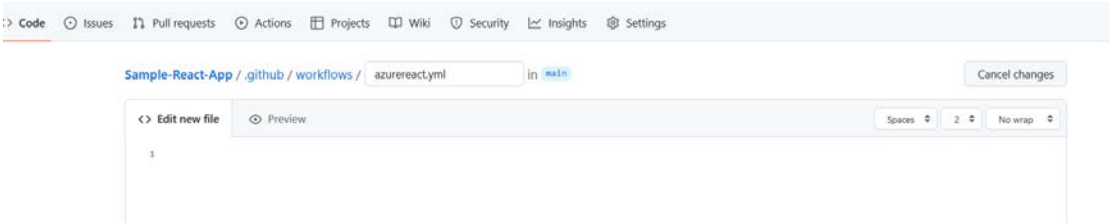
Name *

AZURE_REACT_STORAGE

Secret *

```
===========PASTE THE KEY HERE=============
```

- Add a folder **.github/workflows** folder section to your source code. Inside that folder, create a YAML file named azurereact.yml or whatever you want.

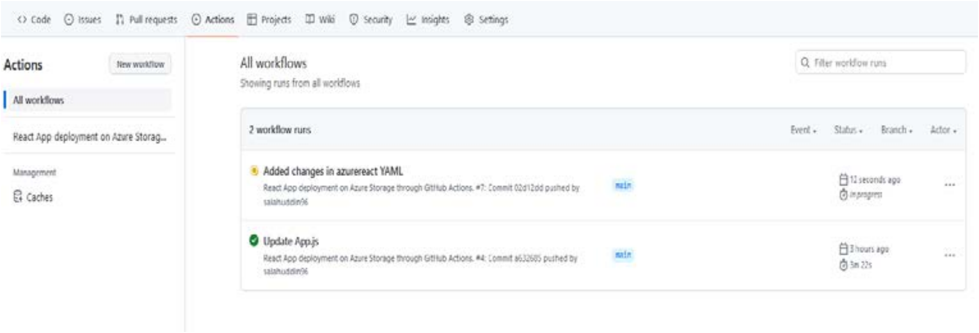


Sample-React-App / .github / workflows / azurereact.yml in main

**Add the following content into .yml file and save and commit into main branch.**

```
name: React App deployment on Azure Storage through GitHub Actions.
on:
 push:
  branches:
   - main
 pull_request:
  branches:
   - '*'
defaults:
 run:
  working-directory: ./
env:
 NODE_VERSION: '16'            # Node version you want to use
 CI: false
jobs:
 build-and-deploy:
  name: Build and Deploy
  runs-on: ubuntu-latest
  steps:
  - uses: actions/checkout@v2
  - name: Use Node.js ${{ env.NODE_VERSION }}
   uses: actions/setup-node@v1
   with:
    node-version: ${{ env.NODE_VERSION }}
  - name: npm install & build
   run: |
    npm install        ## Add your command for building angular project
    npm run build
  - name: 'React App deployment on Azure Storage through GitHub Actions'
   #uses: azure/login@v1
   uses: bacongobbler/azure-blob-storage-upload@main  ##Uploads assets to Azure Blob Storage
   with:
     source_dir: './build'
     container_name: '$web'
     connection_string: ${{ secrets.AZURE_REACT_STORAGE }}
     sync: 'true'
```

- Go to Actions tab you will see the pipeline getting automatically triggered.



All workflows

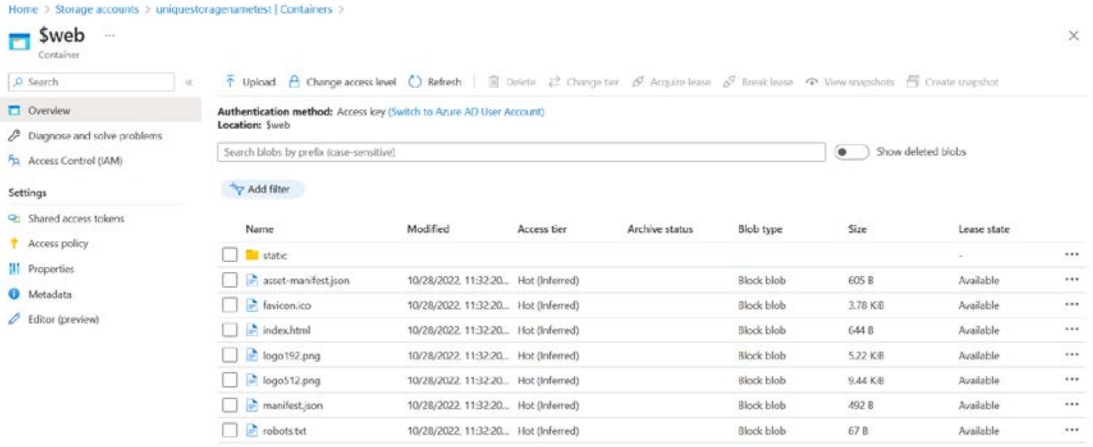
Showing runs from all workflows

2 workflow runs

Added changes in azurereact YAML
React App deployment on Azure Storage through GitHub Actions. #7: Commit 02d12dd pushed by salahuddin96
12 seconds ago
In progress

Update App.js
React App deployment on Azure Storage through GitHub Actions. #4: Commit a632605 pushed by salahuddin96
3 hours ago
3m 22s

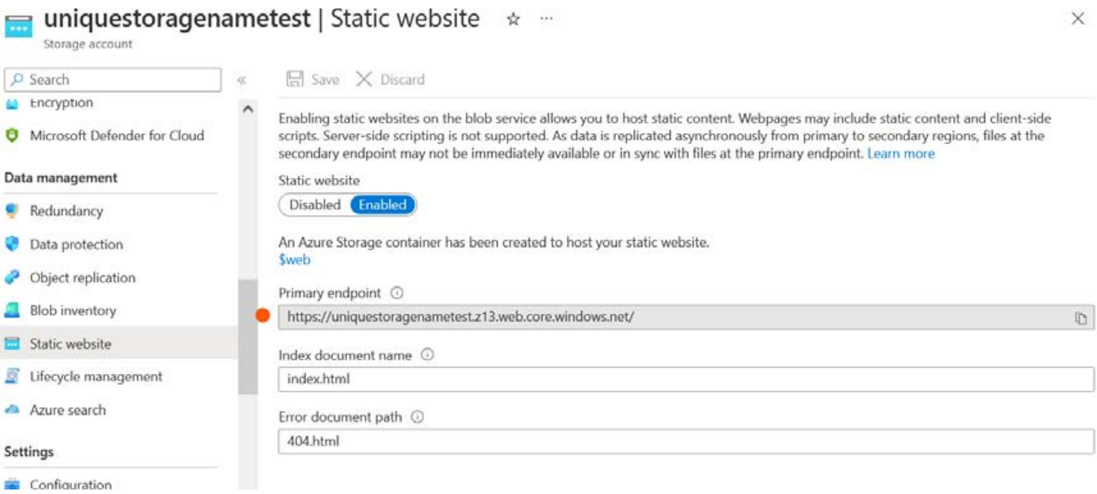
- After successful deployment it will automatically deploy the build artifact files into **$web** container in the storage account.



**Authentication method:** Access key (Switch to Azure AD User Account)
**Location:** $web

| Name | Modified | Access tier | Archive status | Blob type | Size | Lease state |
|---|---|---|---|---|---|---|
| static | | | | | | - |
| asset-manifest.json | 10/28/2022, 11:32:20... | Hot (Inferred) | | Block blob | 605 B | Available |
| favicon.ico | 10/28/2022, 11:32:20... | Hot (Inferred) | | Block blob | 3.78 KiB | Available |
| index.html | 10/28/2022, 11:32:20... | Hot (Inferred) | | Block blob | 644 B | Available |
| logo192.png | 10/28/2022, 11:32:20... | Hot (Inferred) | | Block blob | 5.22 KiB | Available |
| logo512.png | 10/28/2022, 11:32:20... | Hot (Inferred) | | Block blob | 9.44 KiB | Available |
| manifest.json | 10/28/2022, 11:32:20... | Hot (Inferred) | | Block blob | 492 B | Available |
| robots.txt | 10/28/2022, 11:32:20... | Hot (Inferred) | | Block blob | 67 B | Available |

- Copy the primary endpoint from static website section and you are good to go.



Enabling static websites on the blob service allows you to host static content. Webpages may include static content and client-side scripts. Server-side scripting is not supported. As data is replicated asynchronously from primary to secondary regions, files at the secondary endpoint may not be immediately available or in sync with files at the primary endpoint. Learn more

Static website
Disabled [✓ Enabled]

An Azure Storage container has been created to host your static website.
$web

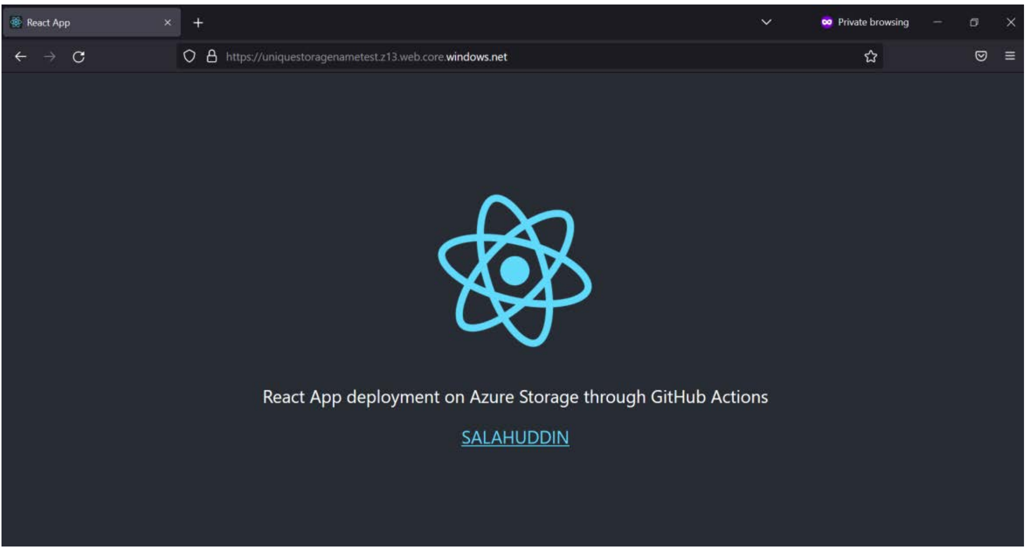
Primary endpoint
https://uniquestoragenametest.z13.web.core.windows.net/

Index document name
index.html

Error document path
404.html

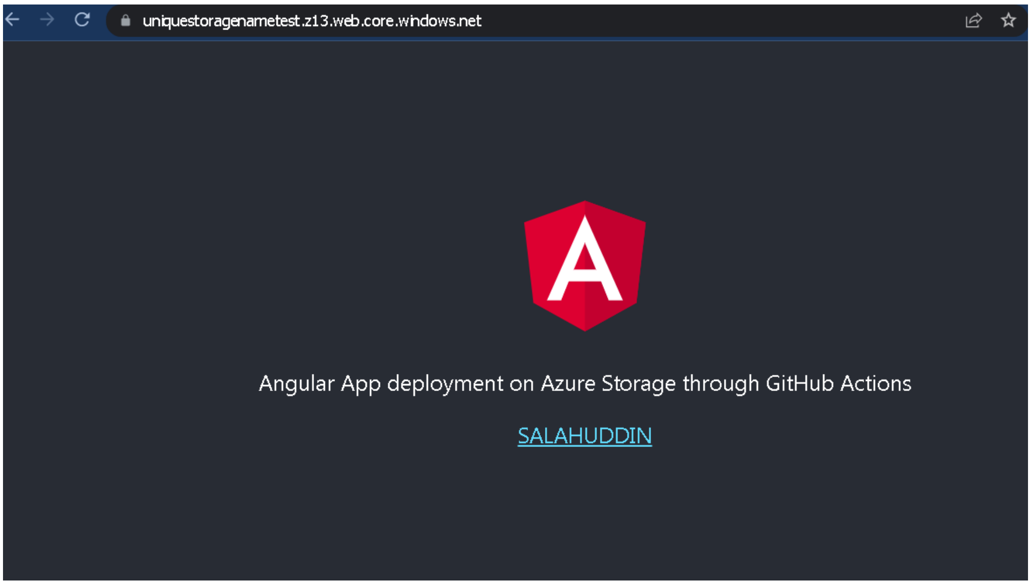
**Output :**
**https://uniquestoragenametest.z13.web.core.windows.net/**

:



React App deployment on Azure Storage through GitHub Actions

SALAHUDDIN



uniquestoragenametest.z13.web.core.windows.net

Angular App deployment on Azure Storage through GitHub Actions

SALAHUDDIN

## Knowledge Sharing for Optimization :

1. Can be used to deploy Angular application with some changes in YAML file
2. With Azure CDN feature we can achieve globally accessibility with almost no latency.
3. It can  be Integrated with any other Micro Service Architecture as well.

## Challenges Faced:

1. GitHub Actions pipeline error for access key configuration.
2. Version Control

## Business Benefits

1. More Cost Efficient than hosting on WebApp/Static Service.
2. High Availability
3. Using this implementation we can boost our deployment speed.
4. Reduced Latency
5. Reduced Workflow Management for Developers
6. Micro-service architecture

## References :

https://learn.microsoft.com/en-us/azure/storage/common/storage-account-create

https://learn.microsoft.com/en-us/azure/storage/blobs/storage-blobs-static-site-github-actions

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