Akilandeshwari Srinivasan(451036)

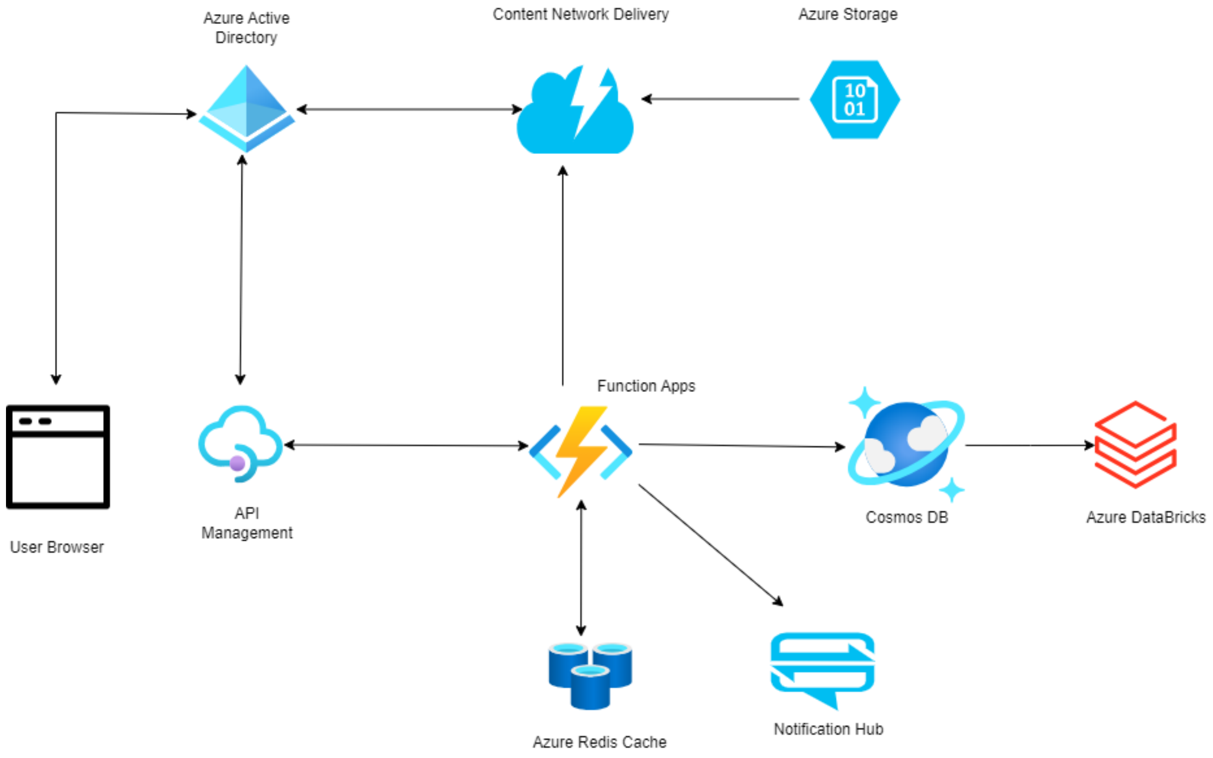
CLCM3403 – Final Exam

Due by : 11-12-2023

Description:

Designing an architecture for a web-based multiplayer game on Microsoft Azure with a focus on player registration, scoring, and leaderboards.

Architectural Diagram:



Chosen Services and Justifications:

Azure API Management:

Justification: Used Azure API Management to manage and secure the APIs used in the game. It provides features like API throttling, caching, and security, ensuring a reliable and controlled API environment.

Azure Active Directory (Azure AD):

Justification: I have implemented secure player registration and login using Azure AD. It ensures robust authentication and authorization mechanisms, enhancing data integrity and user privacy.

Azure Content Delivery Network (CDN):

Justification: I've opted to integrate Azure CDN to efficiently distribute static content such as images and game assets globally. This decision aims to enhance the overall user experience by minimizing load times and ensuring a highly responsive interface. It's a pivotal choice to provide players with swift and seamless access to in-game visuals.

Azure Storage:

Justification: Azure Storage has been selected as the storage solution for player data, scores, and other game-related information. This choice is grounded in Azure Storage's scalability and cost-effectiveness, offering versatile solutions for various storage needs. It provides a reliable foundation for managing and organizing player-related data in a way that aligns with our budget constraints.

Azure Functions:

Justification: The implementation of game logic, scoring mechanisms, and player interactions will be facilitated through Azure Functions. This decision is guided by the serverless nature of Azure Functions, ensuring a cost-effective approach where expenses are directly tied to actual usage. It allows for flexible scaling based on demand, aligning with our goal of creating an efficient and scalable solution.

Azure Cosmos DB:

Justification: Azure Cosmos DB has been chosen as the database solution for storing player data due to its global distribution, automatic scaling capabilities, and support for multiple data models. This decision ensures that our game can seamlessly handle varying levels of player traffic while maintaining responsiveness. It aligns with our goal of creating a scalable and globally accessible database.

Azure Redis Cache:

Justification: The integration of Azure Redis Cache as a caching layer is crucial for optimizing performance. By storing frequently accessed data in-memory, it significantly reduces the load on backend services and improves overall response times. This choice enhances the efficiency of our game, contributing to a smoother and more responsive player experience.

Azure Notification Hub:

Justification: Azure Notification Hub has been selected to implement push notifications. This feature is valuable for engaging players with timely updates, promotions, and in-game events. By leveraging this service, we aim to enhance player engagement and keep the player community informed about relevant activities within the game.

Azure Databricks:

Justification: Azure Databricks will play a key role in data processing and analytics. It enables the analysis of player behaviour, optimization of game mechanics, and provides insights into user engagement. This decision ensures that we have a robust analytical tool to refine and tailor the game experience based on player interactions and preferences.

Interactions Between Services:

Azure AD ensures my secure authentication and interacts with Azure Functions.

Then Azure Functions communicate with Azure Cosmos DB to manage my game data.

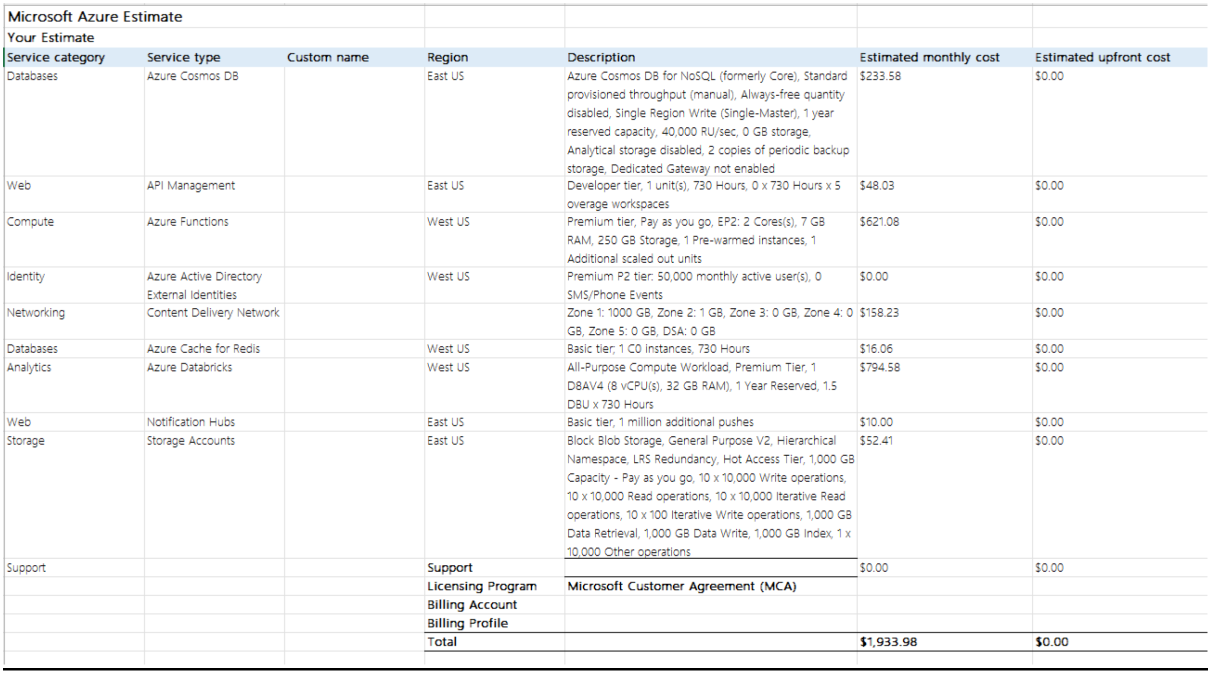
Azure Storage stores static content, and Azure CDN ensures I can access it quickly from anywhere.

Azure Redis Cache is used by Azure Functions to cache data I frequently access.

Azure Notification Hub sends me push notifications based on specific in-game events.

Azure Databricks processes and analyses data from various sources, potentially including my game interactions, logs, and engagement metrics.

Cost Estimation:



Microsoft Azure Estimate

Your Estimate

Service category	Service type	Custom name	Region	Description	Estimated monthly cost	Estimated upfront cost
Databases	Azure Cosmos DB		East US	Azure Cosmos DB for NoSQL (formerly Core), Standard provisioned throughput (manual), Always-free quantity disabled, Single Region Write (Single-Master), 1 year reserved capacity, 40,000 RU/sec, 0 GB storage, Analytical storage disabled, 2 copies of periodic backup storage, Dedicated Gateway not enabled	$233.58	$0.00
Web	API Management		East US	Developer tier, 1 unit(s), 730 Hours, 0 x 730 Hours x 5 overage workspaces	$48.03	$0.00
Compute	Azure Functions		West US	Premium tier, Pay as you go, EP2: 2 Cores(s), 7 GB RAM, 250 GB Storage, 1 Pre-warmed instances, 1 Additional scaled out units	$621.08	$0.00
Identity	Azure Active Directory External Identities		West US	Premium P2 tier: 50,000 monthly active user(s), 0 SMS/Phone Events	$0.00	$0.00
Networking	Content Delivery Network			Zone 1: 1000 GB, Zone 2: 1 GB, Zone 3: 0 GB, Zone 4: 0 GB, Zone 5: 0 GB, DSA: 0 GB	$158.23	$0.00
Databases	Azure Cache for Redis		West US	Basic tier; 1 C0 instances, 730 Hours	$16.06	$0.00
Analytics	Azure Databricks		West US	All-Purpose Compute Workload, Premium Tier, 1 D8AV4 (8 vCPU(s), 32 GB RAM), 1 Year Reserved, 1.5 DBU x 730 Hours	$794.58	$0.00
Web	Notification Hubs		East US	Basic tier, 1 million additional pushes	$10.00	$0.00
Storage	Storage Accounts		East US	Block Blob Storage, General Purpose V2, Hierarchical Namespace, LRS Redundancy, Hot Access Tier, 1,000 GB Capacity - Pay as you go, 10 x 10,000 Write operations, 10 x 10,000 Read operations, 10 x 10,000 Iterative Read operations, 10 x 100 Iterative Write operations, 1,000 GB Data Retrieval, 1,000 GB Data Write, 1,000 GB Index, 1 x 10,000 Other operations	$52.41	$0.00
Support			**Support**		$0.00	$0.00
			Licensing Program	Microsoft Customer Agreement (MCA)		
			Billing Account			
			Billing Profile			
			Total		**$1,933.98**	**$0.00**

References:

Azure Official Documentation