Cloud Hosting Analysis

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Overview

This document presents an analysis of the application hosted on Azure Kubernetes Service (AKS). It identifies opportunities to enhance the infrastructure by integrating additional cloud services, provides a cost-benefit and impact analysis of these proposed integrations, and includes a cost estimation to help minimize operational costs.

Current Infrastructure

The application is currently deployed with the following components

- **Azure Kubernetes Service (AKS):** Hosts containerized microservices, MongoDB databases, and RabbitMQ server for messaging
- **Azure Functions:** Handles notifications

Proposed Cloud Integration Enhancements

1. **Replace self-managed MongoDB with Azure Cosmos DB:**
    - **Reason:** Azure Cosmos DB offers a fully managed NoSQL database service with high availability, global distribution, and scalability.
    - **Benefit:** Reduce operational overhead, better scalability, and improved performance
2. **Replace Self-Managed RabbitMQ with Azure Service Bus**
    - **Reason:** Azure Service Bus provides a fully managed messaging service with advanced features such as dead-lettering, scheduled delivery, and FIFO (first-in, first-out) queueing.
    - **Benefit:** Increased reliability, reduced maintenance, and better integration with other Azure services.
3. **Use Azure API Management for Microservices**
    - **Reason:** Azure API Management provides a centralized gateway for managing, securing, and monitoring APIs
    - **Benefit:** Enhanced security, improved API management, and analytics capabilities.

Cost-Benefit and Impact Analysis

1. **Replace self-managed MongoDB with Azure Cosmos DB**
    - **Cost Impact:**
        - Self-managed MongoDB: Included in AKS cost
        - Azure Cosmos DB: Estimated $1,000/month
    - **Benefit Analysis**
        - Improved scalability and performance
        - Automatic management and global distribution
        - High availability and disaster recovery capabilities
    - **Impact**
        - Migration effort required
2. **Replace self-managed RabbitMQ with Azure Service Bus**
    - **Cost impact:**
        - Self-managed RabbitMQ: Included in AKS cost
        - Azure Service Bus: Estimated $200/month
    - **Benefit Analysis**
        - Increased reliability and reduced maintenance
        - Advanced messaging features
        - Better integration with Azure ecosystem
    - **Impact**
        - Migration effort and potential reconfiguration of microservice
3. **Use Azure API Management**
    - **Cost Impact**
        - Azure API Management: Estimated: $500/month
    - **Benefit Analysis**
        - Enhanced security for APIs
        - Centralized management and monitoring
        - Improved analytics and insights
    - **Impact**
        - Initial setup and configuration effort
        - Possible changes to API endpoints and routing

Cost Estimation and Configuration Proposal

Total Estimated Monthly Cost:

- **Current Infrastructure Cost:**
    - AKS: $900
    - Azure Functions: $100
    - Total: $1000
- **Proposed Infrastructure Costs:**
    - AKS: $900
    - Azure Cosmos DB: $1,000
    - Azure Service Bus: $200
    - Azure API Management: $500

- Azure Functions $100
- Total: $2,700

Conclusion

By integrating these additional cloud services, the application can benefit from improved performance, scalability, and security, albeit at a higher monthly cost. However, these costs cna be justified by the enhanced capabilities and reduced operational overheads. The proposed configurations aim to minimize operational costs while leveraging the full potential of Azure’s cloud services