

41891 Cloud Computing Infrastructure  
Assessment 2: Group Major Project

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# 1 Background

SmartV is a popular online platform providing a wide range of video tools to end-users. Services are provided to consumers over the internet and include video streaming and delivery, video searching, video editing, video transcoding and adaptation.

The SmartV platform is well used and is currently experiencing significant growth in user-base. This trend has prompted a transition from on-premises infrastructure to the cloud with the aim of future-proofing the company's scalability and cost-competitiveness.

## 1.1 Business Requirements

- **Storage:** Large scale, globally accessible storage for video content.
- **Compute:** Scalable and flexible compute for work with video content, such as streaming, editing and transcoding.
- **Scalability:** The ability to scale horizontally and vertically as needs of the business expand over time. This should be trivial once the system is deployed.
- **Networking:** Networking internally in the cloud components needs to facilitate high bandwidth data transfer.
- **High Availability:** Redundancy and high availability is necessary to retain high uptime during disaster recovery or upgrades.
- **Automatic Scaling (DRS):** The ability to match demand for various resources, notably compute, to automatically scale as demand increases and decreases.
- **Resource Control:** Deploying the environment through infrastructure as code allows traceable and consistent changes.
- **Backups:** In case of disaster, backups should be available for all content throughout the system.

# 2 Business Requirements

The operating model of the SmartV platform relies heavily on ready access to large amounts of storage, compute, and networking capability. This is especially true given the large amounts of high resolution video data the platform is expected to process and store. The business requirements captured from this understanding are presented here in two sections: the non-functional requirements relating to SmartV's operations and the functional requirements relating to the cloud infrastructure specifically.

## 2.1 Operational Requirements

The requirements outlined here represent non-functional and operational functions of the cloud infrastructure solution.

### Scalability

Scalability represents a primary business objective for SmartV's transition to cloud-based infrastructure, and underlies most of the business requirements outlined in this document. The deployment of scalable infrastructure provides SmartV the ability to react to fluctuations in platform usage while minimising any costs associated with under-utilised infrastructure.

## **Availability**

The SmartV platform’s customer-facing model requires services to be highly available to end-users, ensuring uninterrupted access to videos and features. Services need to be available even during peak usage times or unforeseen spikes in demand.

## **Reliability**

The cloud infrastructure used to enable SmartV must also prioritise high availability, with resilient architecture that minimises downtime and ensures continuous service delivery.

## **Security**

A high level of security is required to protect user data and the SmartV platform itself. All data hosted by the cloud infrastructure should be encrypted and subject to strict access control and authentication. Both ingress and egress traffic should be restricted with additional monitoring across the network and infrastructure enabling incident detection and response.

## **2.2 Infrastructure Requirements**

The functional requirements of the cloud infrastructure itself form the core project, with each item listed here built on the operational requirements outlined above.

### **Storage**

Effective storage management is a key requirement of SmartV’s infrastructure, with the service housing massive amounts of multi-media data for its users.

### **Compute**

The computational intensity of video based workloads necessitates significant amounts of domain-specific compute availability in the form of graphics processing unit (GPU) access, as well as the additional components required to support them.

### **Network**

High throughput and reliable networking is key to effective delivery of SmartV services.

### **Infrastructure Management**

Deployed cloud infrastructure should be fully managed and configurable in anticipation of changes in future requirements and deployment of new services.

## **2.3 Other stuff DELETE**

“ Some other basic cloud implementation/management requirements, such as high availability, DRS, resource control, updating, etc. ”

### 3 Cloud Architecture and Design

#### 3.1 Platform Selection

#### 3.2 Design Assumptions

#### 3.3 Infrastructure Design

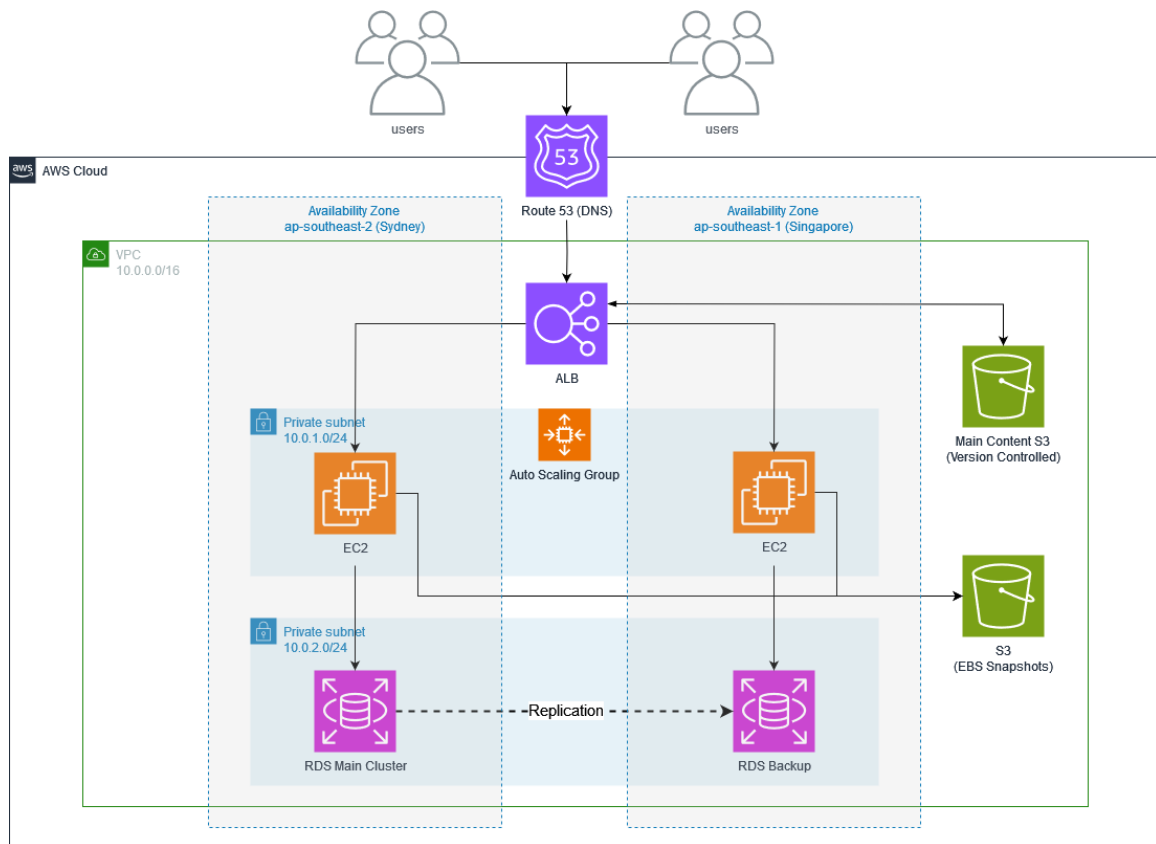


Figure 1: Cloud Infrastructure Topology

#### 3.4 Infrastructure Components

#### 3.5 Pricing

## 4 Considerations and Challenges

## 5 Evolution of Technology