SUPINFO Academic Dept.

SUPINFO International University

INSTITUTE OF INFORMATION TECHNOLOGY

Group Projects
4PJ - MewPipe

Project presentation

2014-2015

Version 1.0
Last update: 03/12/14
Use: Students/Staff
Author: R. BERTHIER/J. BERTON

SUMMARY

1 INTRODUCTION

CIOSC is a hosting company that is creating a new product, MewPipe, designed to host online videos, that can be share with everyone with an Internet link.

You've been chosen as a contractor to design this whole new service, from scratch.

2 FUNCTIONAL EXPRESSION

MewPipe is a website that will allows users to host, share and play online videos.

2.1 SOFTWARE DEVELOPMENT

There are scenarios that must be handled for answering completely to the client needs:

- An user must be able to upload a video, and obtain a link to share it
- An user must be able to edit a video information
  - Only the creator can achieve this operation
- An user must be able to play a video
- An user must be able to control the video while playing (pause, fast forward, rewind, …)

2.1.1 Home page

On the home page of the website, the platform will suggest to users videos that are very played and shared.

2.1.2 Confidentiality features

Each video posted must be attached to a particular confidentiality profile, like the following:

- Public (available to anybody)
- PrivateLink (available to anybody unauthenticated with the link)
- Private (available only to authenticated users)

2.1.3 Account management

Your platform will support account management features, such as create, edit or remove an account. Where an account is removed, all videos uploaded by this particular user must be deleted definitely and securely. When an account is created, ask for an OpenID authentication and obtain the

users information with it (First name Last Name, Birth date, …), so that the users can then authenticate later with those credentials.

2.1.4 Uploading a video

Video allowed on the platform mustn't exceed 500 MB size.

2.1.5 Web services

The website and all of the services related to it will be available on a webpage or via web services, allowing third-party clients to connect to the platform.

2.2 SUPPORTING ARCHITECTURE

As the company is launching in the business, you'll have to design and implement the entire IT infrastructure, including system and network ones.

Your infrastructure will be deployed on two data centers, localized in New York, NY and Dallas, TX. The two data center sites will be included in an Active/Passive cluster, where New York is the active element of it.

2.2.1 Virtualized infrastructure

Starting from the beginning of the company, the CTO wanted to virtualize right away the whole IT infrastructure.

You'll use at each data center site, two hypervisors that'll run the virtual machines of the infrastructure, that'll form a cluster. Those hypervisors must implement high-availability features, such as ones that can prevent a long downtime for virtual machines.

2.2.2 Storage

The virtual machine storage will be ensured exclusively by storage arrays, on a dedicated *iSCSI* network. The storage should also operate as an active/passive cluster, with two nodes per data center.

For redundancy purposes, you'll implement local and remote replication.

The local replication will occur immediately, as a data is changed on the one side. The remote replication will take place between the storage arrays, from the Active to Passive data centers, using a

RPO value of 1 hour.

2.2.3 Network

Because you need to connect your infrastructure to the Internet, you'll use virtual routers to do that. You'll use a cluster of two virtual routers, to ensure high availability. Those routers will act also as load balancers and will redirect the client to the chosen front-end server.

Your virtual network infrastructure must be secured, with implementation of Private VLAN features for servers. It must be also ready for SDN networks.

Additionally, the data centers must be connected via a permanent VPN, formed on the edge routers. All data that are transiting though data centers must be passed into this tunnel.

You'll design the public and private address space according to reflect those needs.

2.2.4 Web Services Infrastructure

You'll implement a three-tier infrastructure, with at all sections, two nodes. The sections are here front-end, back-end and database servers. Data must be replicated between all those nodes.

You are free to use web servers and databases that suit best the client needs. However, the clients want its system infrastructure to run over Windows Server 2012 servers.

2.2.5 Backup

As the client wants to be able to backup the virtual machines, you'll have to implement a backup plan, where the active copies of the production will be sent to the secondary data center.

The virtual machines will be backed up every day, at 2AM on a Linux repository, on the Passive data center site.

2.2.6 Disaster plan

As your infrastructure is critical, you'll also plan and test a disaster recovery plan to activate the Dallas data center site to act as a primary site if the New York one is disrupted. In case of switching, all the data that has been created on Dallas should be replicated right away on the New York data center site, when the data center site is reachable.

2.2.7 IP Telephony

As your customer is deploying its new IT architecture, you're suggesting to the CTO that it'd be a good occasion to deploy VoIP on the whole enterprise scope.

You'll use for this purpose X-Lite VoIP clients, which you'll bind on an IBPX, located on the primary data center site.

The dialplan will contain the following extensions:

- IT Support (134 to 146)
- Accounting (200 to 251)
- Logistic (400 to 478)
- Public Relations (480 to 492)
- Marketing (500 to 634)

All users within the enterprise must be able to reach each other, using the internal extensions.

The IPBX must handle incoming and outgoing calls, using SIP trunks. All users must be able to place call to the French PSTN numbers. You'll bind incoming calls on an IVR server, that'll suggest which department to call to the user, or directly a user. If a department is chosen, ring the ring group of the department, containing all users.

3 DELIVERABLES

Regarding the **development** part, the deliverables are the following:

- The source code
- Any information or dependencies to compile the program
- Any document that you find relevant

Regarding the **architecture** part, the deliverables are the following:

- L2 network topology (Physical topology)
- L3 network topology (Logical topology)
- Network addressing plan (subnets, VLAN, etc…)
- Virtual router configurations
- Step-by-step implementation guide
- IPBX configurations
- Any document that you find relevant

For the whole project, you'll also prepare a PowerPoint project defense presentation, when you'll introduce to potential customers your product.

4 GRADED ITEMS

The project is graded, based on 1170 points, like the following:

- **Architecture (500 pts)**
  - The suggested architecture is corresponding to the client needs (100 pts)
  - The designed architecture is following the best practices (20 pts)
  - The architecture provides virtual machines high availability (40 pts)
  - The architecture is implementing network resiliency (40 pts)
  - The architecture is implementing storage resiliency (40 pts)
  - The architecture is implementing three-tier application architecture resiliency (40 pts)
  - The architecture is implementing high availability across data centers, even in case of a data center full failure (50 pts)
  - The whole infrastructure is backed up and stored on the secondary data center site (20 pts)
  - The deployed VoIP architecture is corresponding to the client needs (70 pts)
  - The dialplan is properly implemented (20 pts)
  - The users can place calls to French PSTN numbers (30 pts)
  - The users can receive calls from the outside, using an IVR, that'll ask for the department or the user ID (30 pts)

- **Development (500 pts)**
  - Users can upload a video under 500MB size (50 pts)
  - Users can obtain a link and share it (50 pts)
  - Users can edit a video information (20 pts)
  - Users can play a video (30 pts)
  - Users can control the video while playing (30 pts)
  - Most viewed and shared videos are suggested (100 pts)
  - Confidentiality features are implemented (50 pts)
  - Create, edit and delete users features (70 points)
  - OpenID authentication is implemented (100 points)

- **Documentation (170 pts)**
  - **Architecture:** Network topologies (10 pts)
  - **Architecture:** Network addressing plan (10 pts)
  - **Architecture:** Virtual routers configurations (10 pts)
  - **Architecture:** Step-by-step implementation guide (20 pts)
  - **Architecture:** IPBX configurations (20 pts)

  - **Development:** Design patterns (15 pts)
  - **Development:** Database structure and optimization (15 pts)
  - **Development:** Ergonomics and ease of use (10 pts)
  - **Development:** Suggested videos algorithm explanation (10 pts)

- Project defense PowerPoint (50 pts)