Hybrid Cloud Services Project Proposal

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1. Vision and Goals of the Project:

Hybrid cloud model has a foreseeable future, because two types of clouds offer drastically different properties (security, performance, bursting capability, features, etc.).

Hybrid model is hard to build and manage (lots of concerns, network connectivity, security, user interaction, etc.) The aim of this project is to lay foundation for creating a completely seamless world, that developers just focus on building application logic, and the infrastructure layer would automatically handle scaling, placing and manage different components on either or both clouds.

A modest goal of this project is to understand the challenges of the hybrid cloud model, develop a simple hybrid cloud application with the stretch goal of providing auto-scaling mechanism. A more ambitious one is to come up with a working example of allowing developers to deploy an application that span both clouds (and they don't even know it).

Users/Personas of the Project:

Hybrid cloud services will be used by researchers from different Universities, industries and government institutions which plan to opt for hybrid cloud.

2. Scope and Features of the Project:

High-Level features of this project include:

Realistic:

- Understanding the challenges of the hybrid cloud model
  - Identifying security constraints during data migrations from private to public clouds
  - Partitioning application between private and public clouds
  - Communication between public and private cloud
- Exploring the options to overcome these challenges
- Setting up hybrid cloud model
- Developing and deploying simple hybrid cloud application using MapReduce
- Writing a research paper manuscript for the project findings, issues and workarounds for hybrid cloud model

Ambitious:

- Defining a model/abstraction with auto-scaling mechanism that developer can interact with the system
- Enabling software developers to automatically deploy an application (code and dependency configuration) that span both clouds without the user knowing the switch between the clouds
- Providing a feedback mechanism to inform the developer about the actual deployed state of the application

3. Solution concept/architecture:

Understanding following cloud functionalities in order to achieve hybrid cloud services:

- Different APIs/services that are exposed by private clouds
- Services of public cloud that can consume private cloud services
- Various modes of connection between the two clouds
- Ways to make the connection secure and private like using VPN, etc.
- Seamless and secure data migration

Using the above findings, develop and deploy a small application on hybrid cloud.

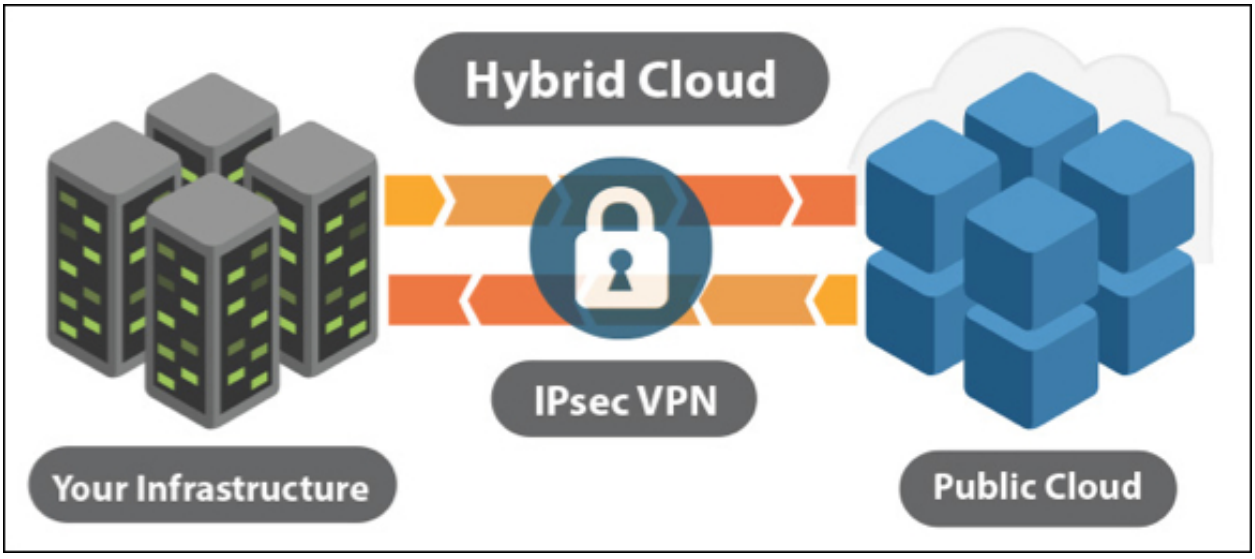

Figure 1: Hybrid cloud architecture

4. Design implications:

We will update design implication as the research progresses.

5. Acceptance Criteria:

- Explore the challenges and the related work done
- Develop and deploy MapReduce application on hybrid cloud successfully
- Write the research paper manuscript

6. **Release Planning:**

We are doing bi-weekly Sprint planning with weekly updates to the mentors.

Release #1: (Feb 12, 2016):

- Understanding the challenges of hybrid cloud model
    - Study working of public cloud, its architecture, benefits and limitations
    - Study working of private cloud, its architecture, benefits and limitations
    - Research on how private and public cloud can be connected
    - Explore ways to secure the connection between private and public cloud
    - Migrate application and data seamlessly
    - Check means of providing auto-scaling in hybrid cloud environment

Release #2: (Feb 23, 2016):

- Establishing secure connection between private and public cloud
    - Get access to private and public cloud
    - Securely connect and transmit data packets between private and public cloud
    - Setting up Hadoop for development

Release #3: (Mar 15, 2016):

- Develop hybrid cloud application
    - Create MapReduce program for a simple application
    - Execute application locally and triaging

Release #4: (Mar 29, 2016):

- Deploy hybrid cloud application
    - Run MapReduce job on hybrid cloud
    - Analyze the output on private cloud

Release #5: (Apr 12, 2016):

- Fix issues with hybrid cloud application, if any
- Document the hybrid cloud implementation details, issues and workarounds

Final Demo: (Apr 26, 2016):

- Final deployment and release management