Composition of Semantic Web Service on Cloud : A QoS View

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Problem Domain

- Different service provider provide different service through cloud.
- Selection of service are done on basis of cost cost.
- Ignore the other QoS of services.
- No proper definition and calculation QoS of cloud is available.

Introduction

- Purpose of research
  - Virtualization support to cloud service.
  - Define and Calculate QoS of Cloud Service.
  - Customized selection and Composition of Cloud Service.
- Searching service on cloud using Cloud Ontology Description.
- Details of service using semantic description for full potential semantic web service.

Cloud Definition

Cloud computing is

- ubiquitous
- convenient
- on-demand network

a model for enabling **access to a shared pool of configurable computing resources**

Three Service Model

- IaaS(Infrastructure as a Service)- basic computing and storage resources Ex. Amazon EC2, vCloud
- SaaS(Software as a Service)- cloud applications Ex. Office 365, Gmail
- PaaS(Platform as a Service)- cloud application infrastructure Ex. Salesforce.com, Windows Azure

Available	Standalone Servers	IaaS	PaaS	SaaS
Applications	No	No	No	Yes
Runtimes	No	No	Yes	Yes
Database	No	No	Yes	Yes
Operating System	No	No	Yes	Yes
Virtualization	No	Yes	Yes	Yes
Server	No	Yes	Yes	Yes
Storage	No	Yes	Yes	Yes
Networking	No	Yes	Yes	Yes

Figure: Comparison

This project is IaaS type model.

Life Cycle of Cloud Service

Service Requirement	Functinal Requirement Technical Requirement Budgetary Requirement
Service Discovery	Cloud Service matches with requirement
Service Negotiation	Messages exchanged to establish SLA
Service Composition	Combination of set of services (single virtualized service)
Service Consumption	Delivery of service

Figure: Cloud Life Cycle

Problem with Simple Web Service

- It specifies appearance, not meaning.
- It is fine if interaction is with human,but if you want your agents to be able to process the information, they need to be able understand what is on a web page.
- UDDI do not provide complete description.

Semantic Web Composition

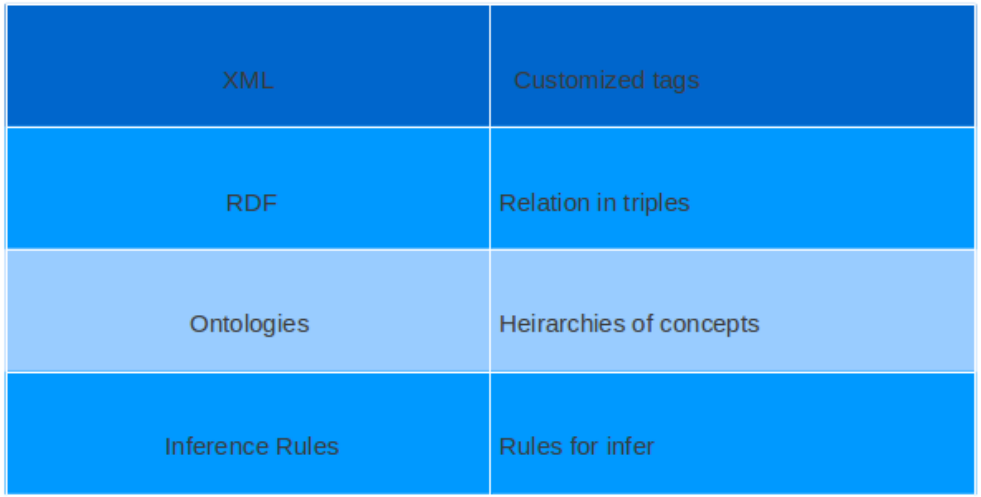

Figure: Semantic Web Composition

- Ontology- A set of statements (and usually rules for reasoning)about the world
- E.g.: Publications (e.g., books, magazines, articles)and their properties (e.g., titles, authors,reviews, reprintings)

Approach Details

1. Develop a cloud.
2. Creation of semantic web service.
3. Deployed it to virtual servers.
4. Searching and Composition of service.
5. Calculate cloud QoS and comparing results.

System Architecture

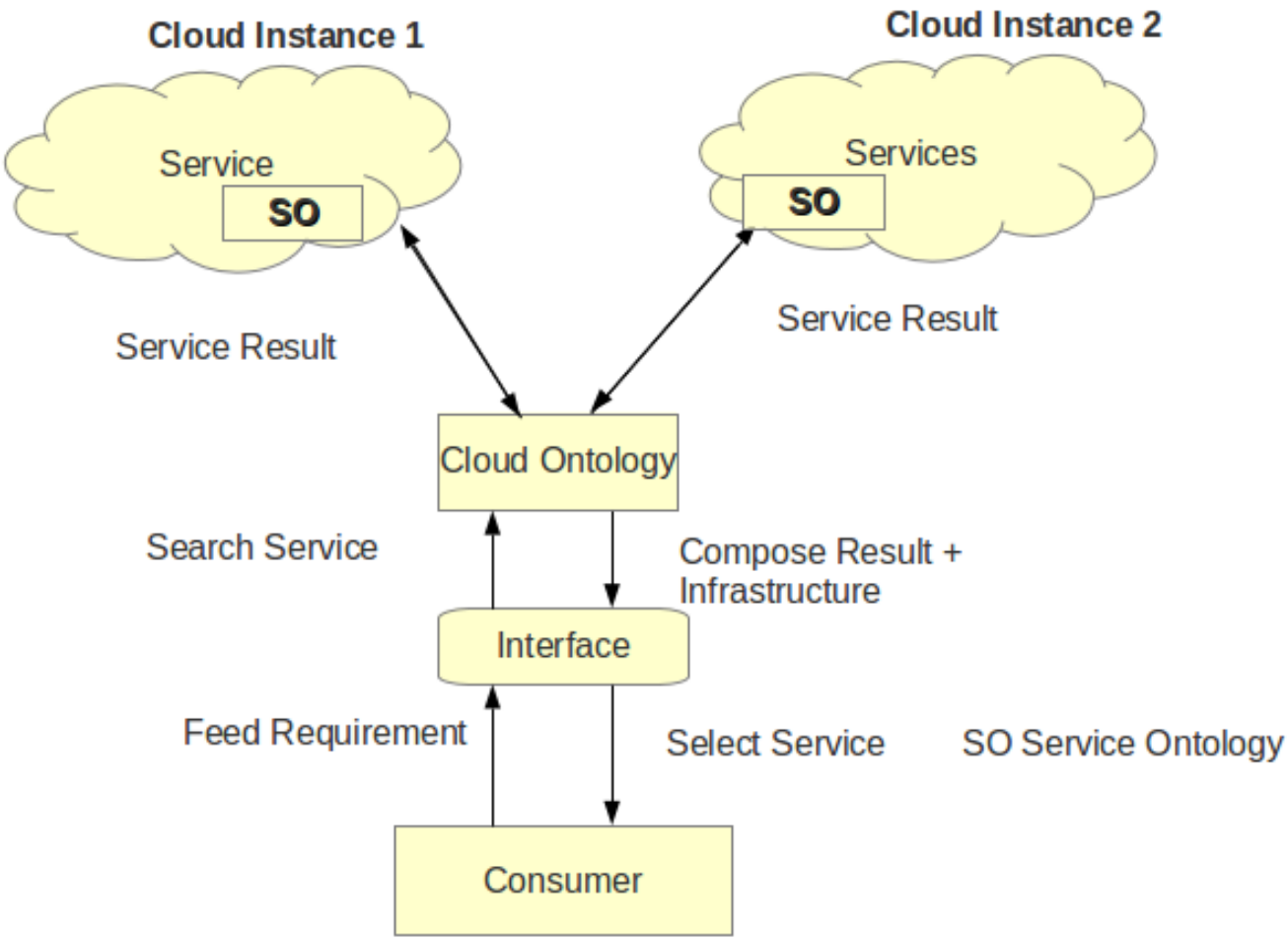

Figure: System Architecture

QoS Definition and Comparison

In this method, three level of QoS of cloud services are calculated they are

1. On cloud software components on which cloud is developed.
2. Infrastructure of instance on which service is deployed.
3. Service level response time.

Cloud Level QoS (Level1)

```
[root@cloud ~]# euca-describe-groups
GROUP   742113722717    default default group
PERMISSION      742113722717    default ALLOWS  tcp     22      22      FROM
GROUP   742113722717    MySecurityGroup Ping,http,ssh
PERMISSION      742113722717    MySecurityGroup ALLOWS  tcp     8080    8080
PERMISSION      742113722717    MySecurityGroup ALLOWS  icmp    -1      -1
PERMISSION      742113722717    MySecurityGroup ALLOWS  tcp     22      22
[root@cloud ~]#
```

Figure: Security Groups

Instance QoS(Level 2)

The infrastructure used by instances describe its QoS which includes the CPU, Disk space and number of CPU.

Table: Service with their Instance

S.No.	Instance	PublicIP	RAM	DiskSpace	CPU
1	Instance1	10.1.175.110	512	5GB	1
2	Instance2	10.1.175.111	512	5GB	1
3	Instance3	10.1.175.112	1024	10GB	2

Service Response Time (Level3)

Response Time = Time of receiving Response − Time of making the request

Table: Service with their Instance

S.No.	ServiceName	InstanceUse
1	HotelA	Instance1
2	HotelB	Instance2
3	TrainA	Instance1
4	TrainB	Instance2
5	BusA	Instance1
6	BusB	Instance2
7	FlightA	Instance1
8	FLightB	Instance2

Cloud

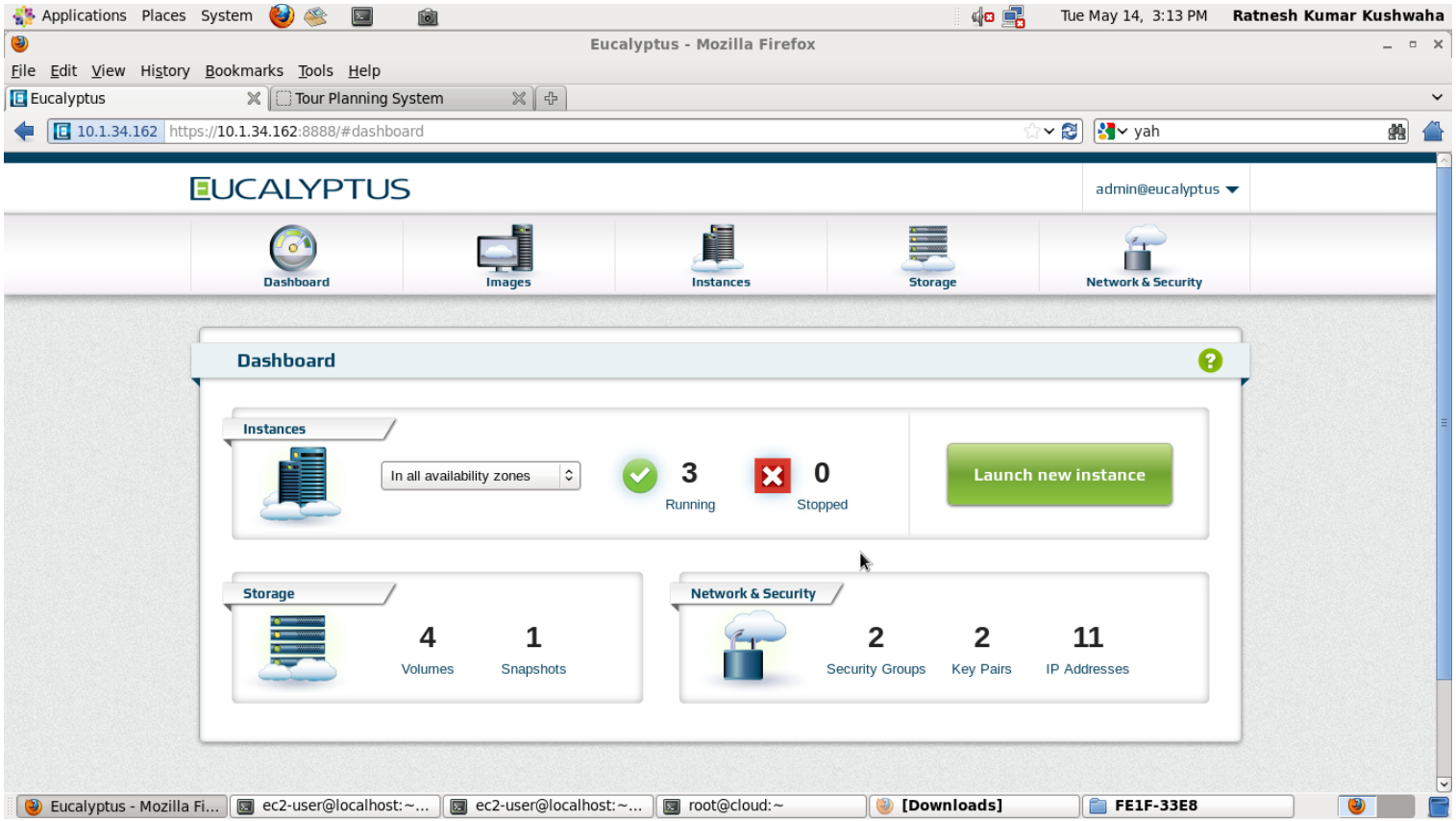

Figure: CloudHomePage

CloudInstances and Images

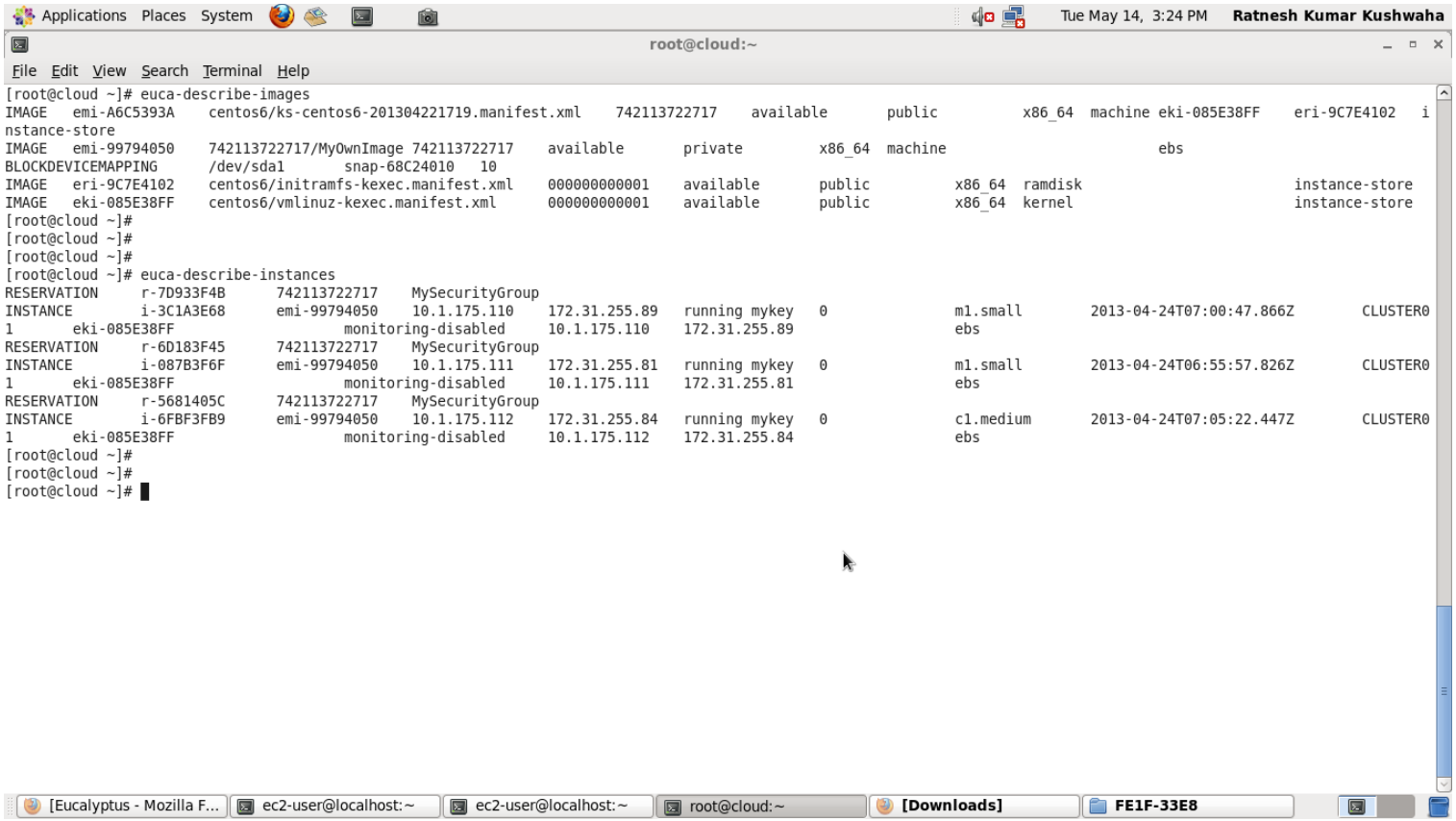

Figure: Eucalyptus Commands

Instances Comparison

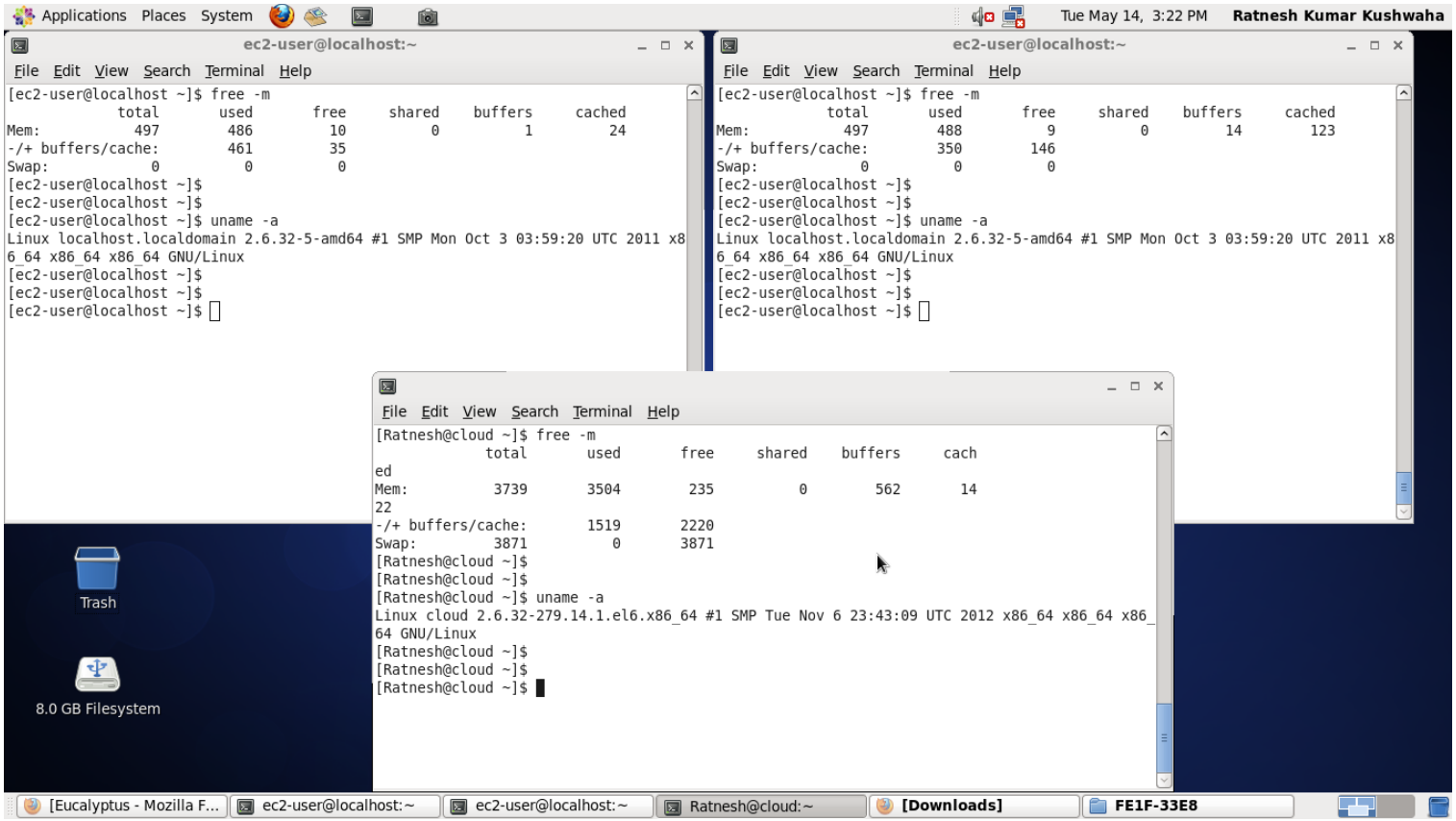

Figure: Eucalyptus Commands

HomePage

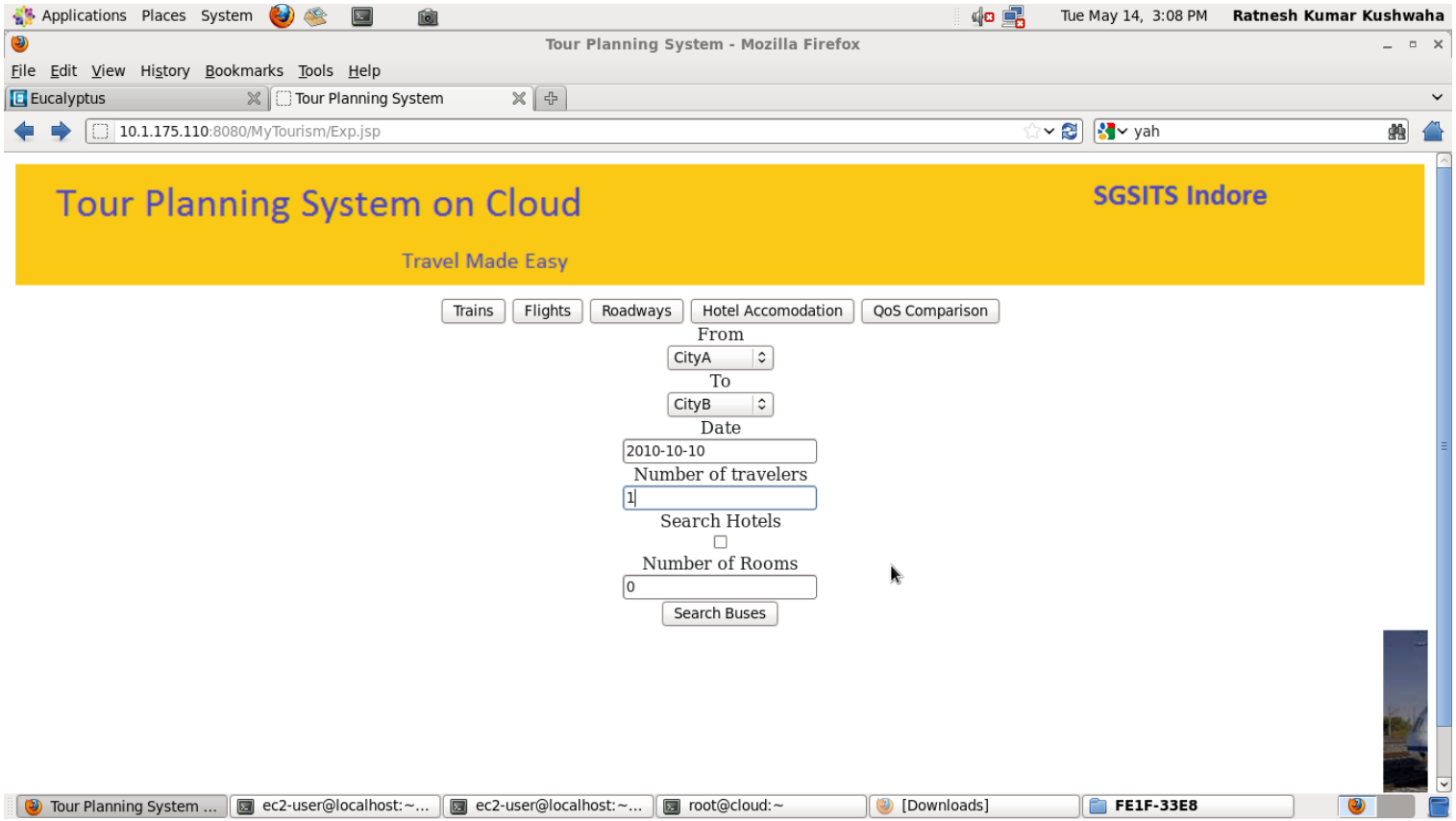

Figure: HomePage

SearchResult

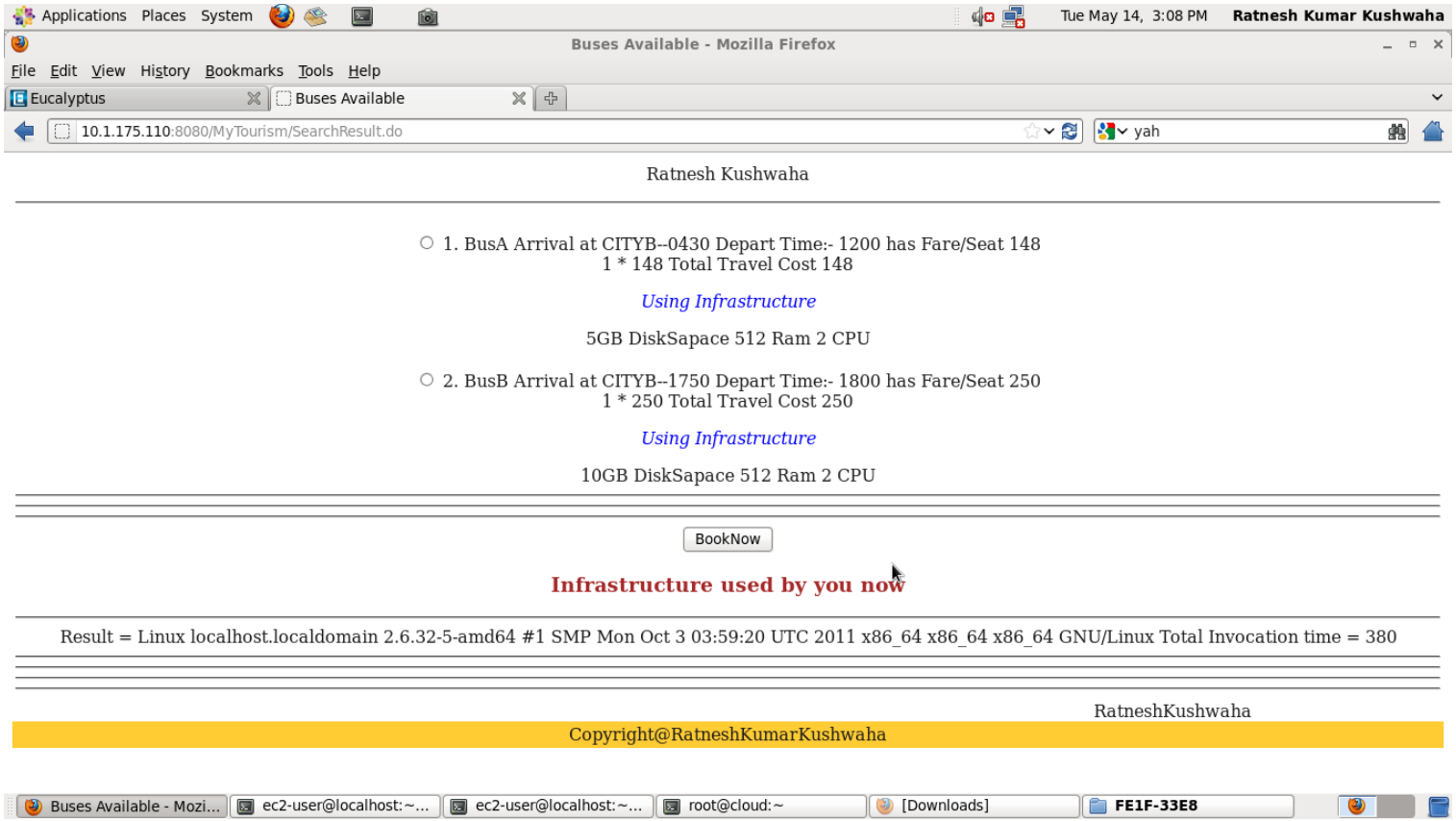

Figure: SearchResult

ResponseTimeGraph1

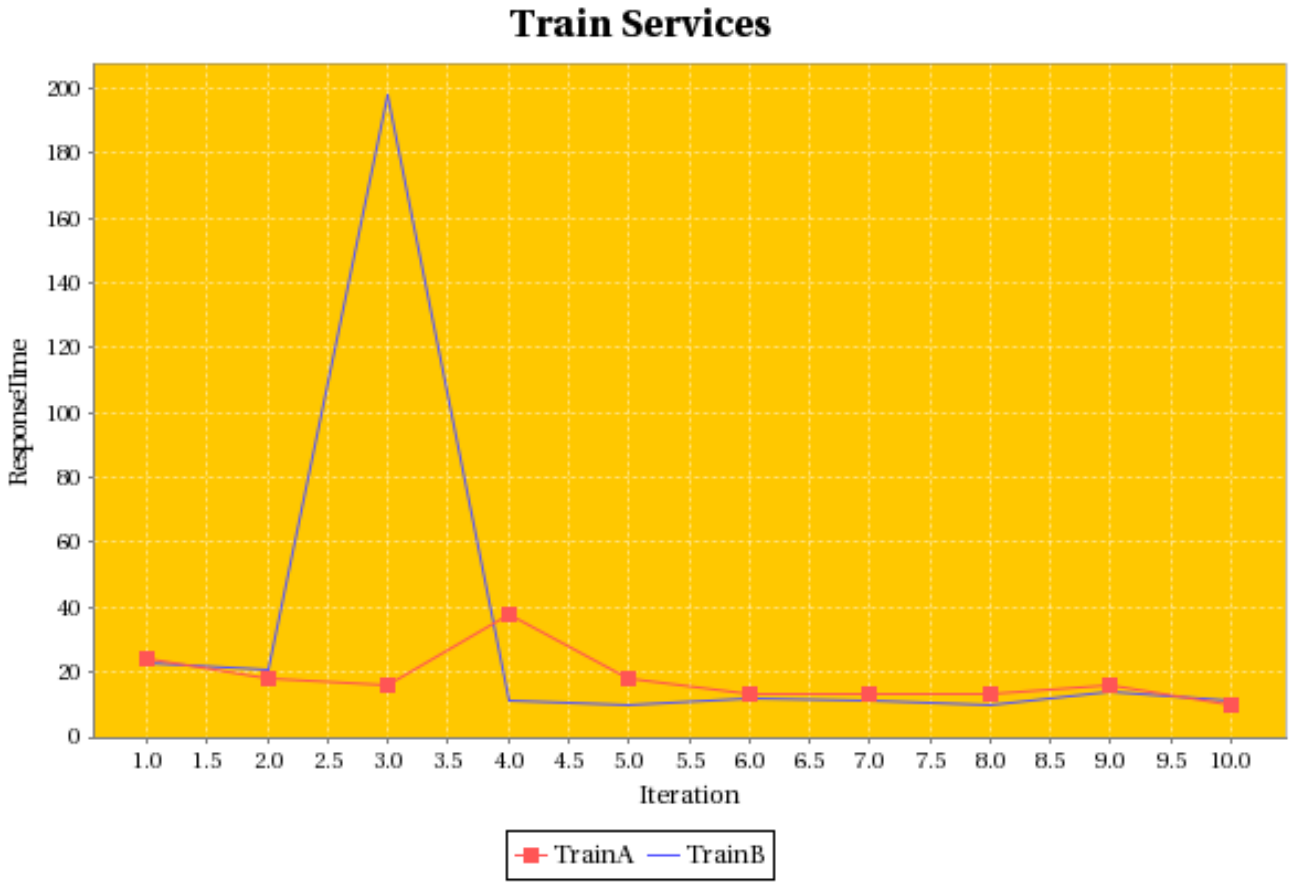

Figure: Graph1

ResponseTimeGraph2

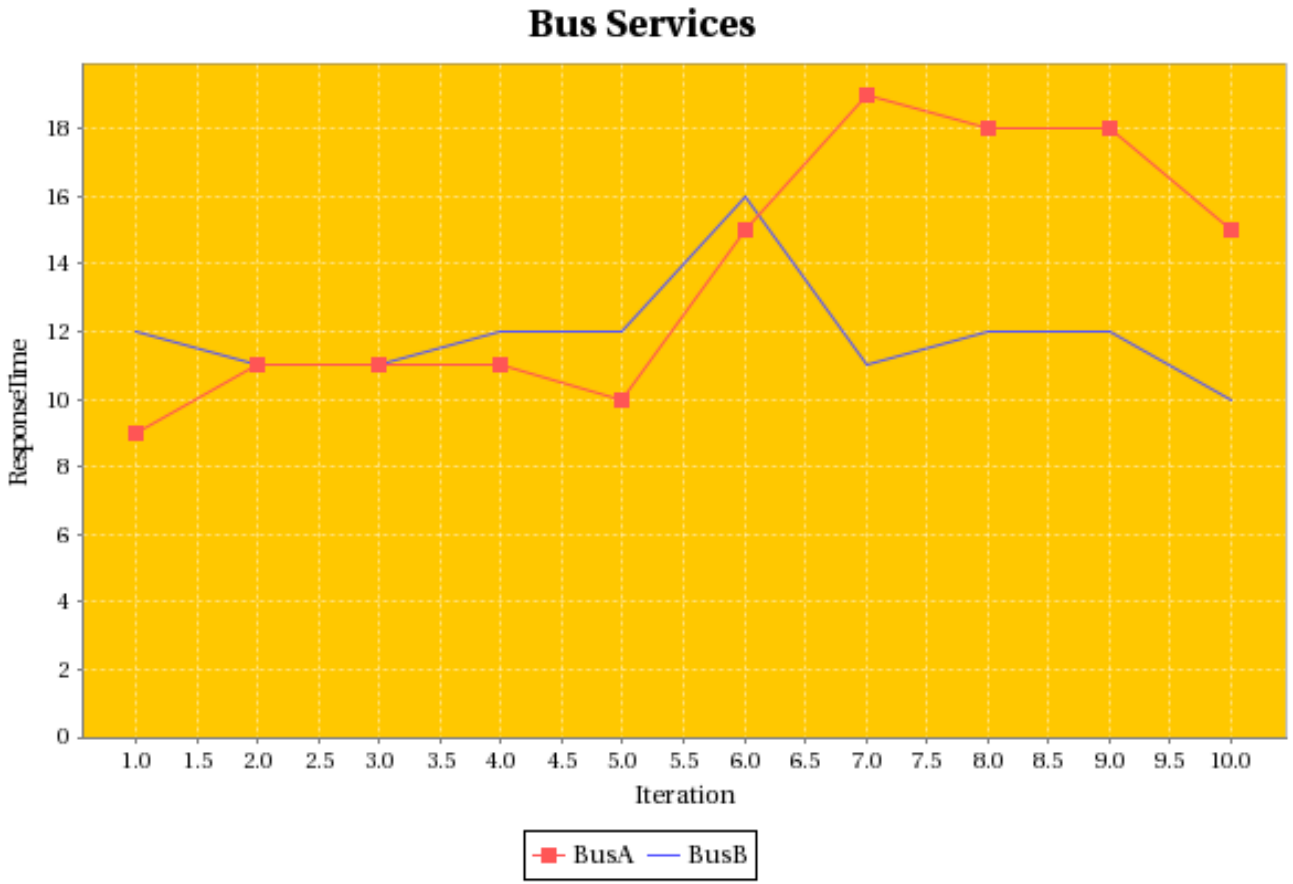

Figure: Graph2

Conclusion and Limitation

- The experimental results show that ontological description is best for searching cloud services.
- To describe QoS we need three level of comparison.
  Limitations
- Limitation of ontology (Updating Problem).
- Limitation OWL API.

Future Work

The present work uses ontologies to describe web service. The agents uses this description for composition of web service within a cloud using cloud instance. The work can be enhanced by composing service on different clouds. These clouds should be developed using different technologies for better comparison and results.

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Thank You

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