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8. Personal Understanding and Advice

In this section I will present my personal understanding of the above research work and w
my personal opinion about some of the concepts presented by the researcher in his
defence presentation.

8.1.Personal Understanding

The proposal is a research about virtualized infrastructure for IVR services, whic
use for long now in different aspects of life, initially it was carried out by touchto
dial pads but nowadays voice recognition software's have made a change in the w
getting input for an IVR system, though voice recognition systems still
improvement. The researcher has explained the basic concepts simply and clearly,
provided basic concepts of the paradigms used in research like cloud computing,
SaaS, PaaS and IaaS, he has also provided with his simulation and evaluation so
snapshots that made it easy to understand and comprehend.

8.2.Advices

The defence indeed gave us many simulation results and measurement analysis, w
provide us quite a few conclusions. But as the researcher said cloud computing has
standardized yet, so it means that until cloud computing is standardised, we can see
virtualized IVR applications with their own standards; hence making the future is
tough and unclear.

6.2.Software Tools

The researcher used following research tools for concept evaluation and simulation.

- **IVR substrates**
  - Implemented using **D**onkey **S**tate **M**achine (DSM)
  - Deployed on **S**ip **E**xpress **M**edia **S**erver (SEMS)
- **Virtualization**
  - XEN server, a Cloud-proven virtualization platform
- **REST Interfaces and Repository**
  - Implemented using jersey APIs (JSR 311)
  - Deployed on glassfish server
- **IVR Clients**
  - X-lite a free SIP client

7. Conclusion

The researcher presented a novel architecture for a virtualized IVR infrastructure. architecture allows diverse IVR service providers to share the same IVR substrates and under same environment, and enables easy development and management of new IVR-b applications via a simplified platform.the researcher presented some lessons and conclus one of the lesson from this research is that composing and managing IVR applications in Cloud issues many challenges, the researcher argued that none of the existing relevant w meet all the derived requirements, and further proposed that the proposed architecture is a v and promising approach for a virtualized infrastructure for IVR applications as services, researcher also presented a prototype that shows how a new service (i.e. automated assistant) be created by composing a number of existing simple IVR services provided by infrastructure. A proof of concept prototype was also implemented by creating software, concept evaluation was performed and evaluation measurements were presented by researcher.

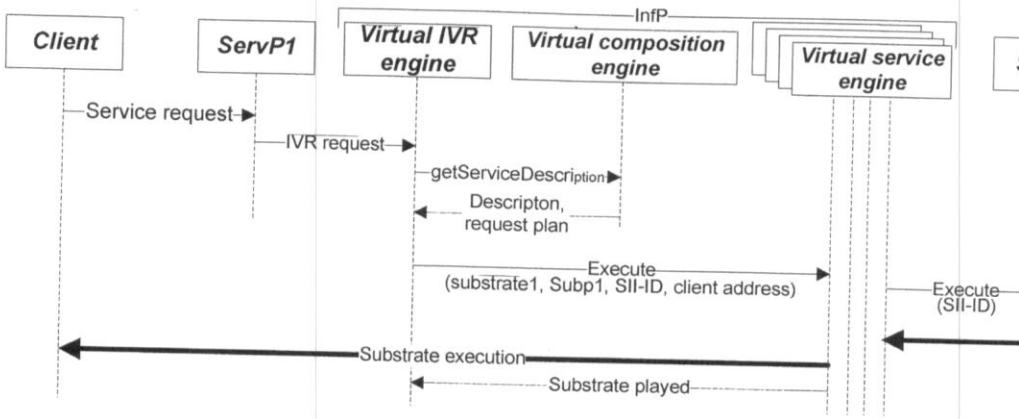


Figure 10: Execution phase [1]

5. Concept and Evaluation

In this portion the researcher presented a software architecture designed for evaluation p with a focus on IVR substrate repository and the composition and management planes. Th substrate repository includes a publication manager and a discovery manager that handl publication and discovery requests, respectively. The published service descriptions are sto a local database [1].

The virtual work engine includes three functional entities: the service creation coordinato discovery engine and the service activation coordinator. The service creation coordinator ge list of available substrates from the broker (using the discovery engine) and sends them platform provider. It also takes the inputs from the platform provider GUI for the service composition, it than creates the description file for the composed service, and stores the description in a local database. The service activation coordinator manages and coordinates the instantiation of new SIIs [1].

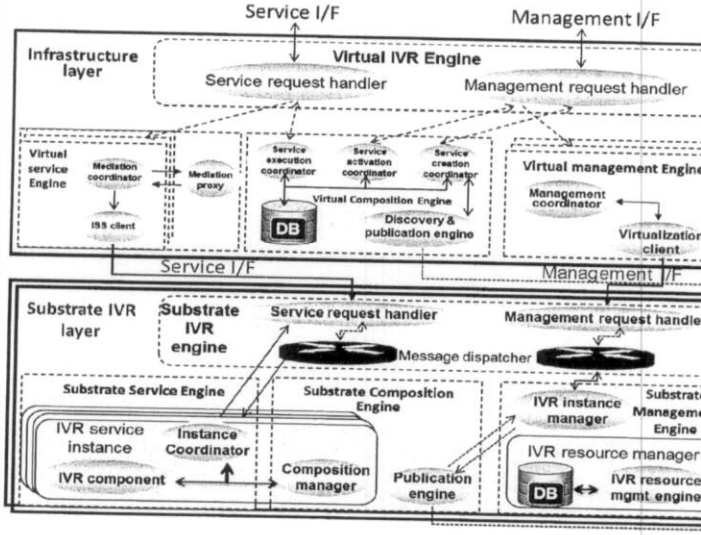


Figure 11: Software Architecture

	❖ **Ability to publish and discover substrates and substrate instances.**
Cloud general requirements	❖ Platform provider should add some level of abstractions to the substrates available in IaaS. ❖ Service provider in the SaaS layer should be able to **compose** the substrates. ❖ Different IVR applications in different domains should be able to **share** the same substrates. ❖ IVR application should also be able to use many **instances** of a same substrate.
Virtualized IaaS requirements	❖ Applications and substrates **instantiation.** ❖ Offering of substrate and newly composed applications. ❖ **Transparent** execution to third parties.

Figure 4: Requirements [2]

3.1.Relevant state of the art

In this section the researcher explained the relevance of cloud overall approaches that of the state of the art requirements.

Cloud overall approaches

- ❖ Architecture of a **Videoconference** as a service
- ❖ Architecture of a Cloud **conference room**
  - No Infrastructure with substrates that can be **published**, **discovered** dynamically **shared**
  - No **IVR** features
  - No service **composition**

database and application servers to retrieve records and information r
during the course of a call.

- **Back-end servers**

Back-end servers are existing venture servers on which the requisite custo
corporate data can be found. Back-end servers can include databases, mainf
Java or other application servers, and third party information service
solutions [4].

- **Telephony Infrastructure**

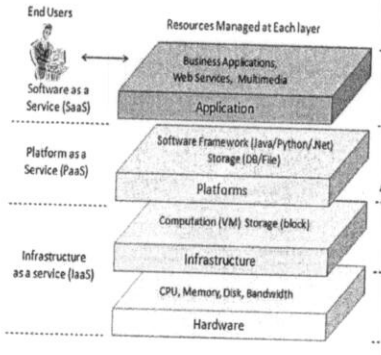
Telephony transportation includes telephone lines, call transferring gear, ar
center Automatic Call Distributors (ACDs) [2]. Telephone lines for IVR c
standard analog lines or digital ISDN lines. These lines are linked on one s
the IVR platform and, on the other, to call switching equipment including
switches, Voice over IP gateways, and corporate PBX's; or in some cases, di
to call centers via an ACD [4].

- **IVR Experts**

IVR Experts include employees and consultants who know IVR technolog
challenges well. Ideally, IVR teams should include one or more members
have experience with IVR integration, configuration, reliability and redund
application development, and IVR solution deployment management [2].

2.3.Cloud Computing

In this part the researcher discussed the term Cloud Computing, and described it a
allegory for the Internet, "the cloud" is a familiar chestnut, but when shared
"computing," the meaning gets bigger and fuzzier. Some analysts and vendors describe c
computing scarcely as an updated version of utility computing: basically virtual ser
available over the Internet. Others go very broad, in opposition anything you cons
outside the firewall is "in the cloud," including
conventional outsourcing [5].



Ref? Thesis p. 16

Figure 1: Cloud Computin

2. Literature Review

In this section the researcher gave us some basic concepts and explanations about IVR computing, virtualization and RESTFul web services.

2.1.IVR

IVR - short for Interactive Voice Response - is a technology that automates interaction telephone callers. In telecommunications, IVR allows clientele to correlate with a com catalog via a telephone keypad/touchpad or by speech recognition, after which the examine their own inquires by following the IVR conversation [4]. IVR systems can with prerecorded or animatedly generated audio to further direct users on how to ad IVR applications can be used to be in charge of almost any function where the crossing can be broken down into a series of simple interactions. IVR systems deployed network are sized to handle large call volumes, because you never know at any time; can be a random number of users looking for help or services.

IVR technology is also being introduced into automobile systems for hands-free oper Current deployment in automobiles revolves around satellite navigation, audio and n phone systems. A recent application based on IVR paradigm can be observed in the sha SIRI personal assistant introduced by Apple ® Inc.

2.2.IVR Delivery requirements

To deliver or leverage IVR, an enterprise or service provider requires:

- **IVR Platforms**

  IVR platforms are the "server and operating system" hardware and soft platforms on which IVR solutions run [4].

  IVR platforms at a lowest amount; facilitate to play and documentation pro and collect touch-tone input. IVR platforms may also propose the abilit distinguish oral input from callers (voice recognition), interpret text into sp output for callers (text-to-speech), and transfer IVR calls to any telephone or centre agent [4].

- **IVR Applications**

  IVR applications are programs that manage and act in response to calls on IVR platform. IVR applications can either be developed by a venture, by an development shop, or by companies that present canned IVR applications IVR applications direct the IVR platform to respond callers, collect input, transfer callers to other phones. IVR applications also call on existing back-

1. Introduction

In the introduction part the researcher presented the subject matter of his research, pr faced during the research process and his motivations and objectives to undergo the re during his MSc.

1.1.Problem Statement

There're some main problems as stated, firstly how to ease the development and managem IVR applications in cloud settings, the most important issue is that of voice recognition, recognition software has been much talked about over a number of years as a solution, but yet to reach maturity. However, indications are that serious usage of this technology is r away. Before that comes about it behoves the industry to think about the social and consequences of what it is doing [3].

Secondly, Historically, IVR solutions have used pre-recorded voice prompts and men present information and options to callers, and touch-tone telephone keypad entry to g responses. Modern IVR solutions also enable input and responses to be gathered via sp words with voice recognition. This transition from touch-tone and pre-recorded input to ru voice has still some issues that have to be taken care of.

Thirdly, there is no standard definition for cloud computing as yet, so it's hard and delicat the researcher to set a standard.

1.2.Motivations

One of the motivations of this research was to move IVR to cloud systems, the reason proposing to do this move is to offer quick, easy, low-cost and ready to assemble componen cloud settings.

The other main motive of this research was to introduce novel value-added services for application service providers.

1.3.Objective ?

The researcher gives us the main object of the research as to present a novel architecture relies on RESTFul Web services for a virtualized IVR infrastructure.

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Abstract

Interactive Voice Response (IVR) applications (e.g. programmed assistant) are ever
nowadays. IVR is a technology that allows a computer to interact with humans through
of voice and DTMF keypad inputs. Cloud computing is an up-and-coming versatile hypot
form of distributed computing (Infrastructure as a Service – IaaS, Platform as a Service –
and Software as a Service – SaaS) with several intrinsic paybacks (e.g. resource efficienc
A recent application based on IVR paradigm can be observed in the shape of SIRI p
assistant introduced by Apple ® Inc, can be fitted under SaaS category of IVR. Quite a
some, IVR applications are presented today in distributed paradigms in spite of all the po
benefits. IVR technology is also being introduced into automobile systems for han
operation. Current deployment in automobiles revolves around satellite navigation, aud
mobile phone systems [2].

The MSc defence discussed a novel architecture for a virtualized IVR infrastructur
demonstrated its prospects with a case study. The architecture presented in the PhD d
proposes IVR substrates that are virtualized, poised, and assembled to build IVR applicatio
counts on a business model which introduces the concept of IVR substrate provider as a ne
in the cloud business model. In the case study, which includes a prototype, IVR service pro
develop and manage IVR applications using a simplified platform that adds a level of abstr
to the substrates available in the virtualized infrastructure. The applications are offered as
to end-users.

Keywords— Program assistant, cloud computing, everything as a Service, IVR, Infrastructu
a Service, virtualization

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[Very Good Scene]

A Seminar Report

On the topic

A Virtualized Infrastructure for IVR Applications as Services

A Report Submitted under the requirement
of ELEC 6961 to Dr Rabin Raut.

Concordia University