Concrete and Effective e-Governance Framework

Minimum Government Maximum Governance

more from less for more and more

http://akola.nic.in/vm1.html

by

Nitin V. Choudhari, Scientist C & District Informatics Officer (DIO)

National Informatics Centre (NIC)

NIC District Unit, Akola 444001 (Maharashtra)

- **In Skoch Awards for Excellence 2014 selected as amongst the best project in the country as " Skoch Order of Merit"**
- **Winner in e-Governance Category of Manthan South West Award 2014 (Winner out of 180 entries from 12 States)**
- **eMaharastra 2013 Excellence Award: Best G2G Initiative**
- **e-Gov Champion 2013 on UN Public Service Day**

Topics Covered

- Overview
- Challenges: Pre-scenario
- Objective : Why this research?
- Solution :Framework used
- BPR
- Technology used: Step Towards Effective e-Gov
- Methodology
- Achievements
- Evidences of Success
- Conclusion: Key learning
- Cost effectiveness
- Roadmap

Overview

Implemented utility computing to facilitate effective e-Governance with efficient, optimized use of resources for the improved service delivery, throughput, efficiency and cost effective solutions for National Land Record Modernization Program (NLRMP) MMP in Maharashatra using

- Virtualization using FOSS (Free and Open Source Software's) like user customizable ready usable Virtual Machines (VM) to use single physical computer system virtually as multiple computer systems by virtual isolated execution of virtually developed computer systems on the physical computer system simultaneously. Developed cloud of variety of FOSS like user customizable and ready usable Virtual Machines of distinct Operating Systems.
- Server consolidation by installing server and client on the single physical computer system to save server hardware per location.
- Developed Secured Data Centre and
- Hosted the cloud of Virtual Machines on Data Centre and Disseminated ready usable Virtual Machines widely leveraging shared infrastructure govt. network NICNET

This project is basically the innovative initiative for National Land Record Modernization Program (NLRMP) related applications for the optimum use of technical Hardware, software, Network,human resources and time.

Problem Areas

Project: LRC PCIS, LMIS, NLRMP e-Chawdi , e-Mutation

Targeted Beneficiaries / Stakeholders

- **SLR, Dy SLR, TILR offices** for Property Card Information System(PCIS), Property card data hosting on district web site.
- **SDO, Tahsildar Offices** for Land Management Information System (LMIS), Agri census, 7/12 data hosting on district web site, e-Chawdi and e-Mutation.
- **NIC District Units** for technical implementation and support , disaster recovery for PCIS, LMIS, Agri census, implementation at district, sub division and Taluka level, 7/12 and property card data uploading on web site, Agri Census, e-Chawdi, e-Mutation, unicode data conversion.

Prescenario : challenges

- Pre scenario : **Challenges**
- **In around 2011, while implementing Land Records computerization 7/12 (LMIS) , Property card (PCIS) application, then for uploading 7/12 and property card data on district website , NLRMP e-Chawdi and e-Mutation and Agri Census , both District level as well as Tahsil level Tahsildar, TILR offices in all the districts were facing strong challenges for the availability, operability and maintenance of compatible software hardware technical equipments specifically for the Red Hat Linux 7.2 Server. Under this situation implementation of the concerned applications appears to be a big challenge.**

  - TILR Offices, SDO and Tahsildar offices facing strong difficulties related to availability, operability and maintenance of hardware, software resources for LRC, particularly as there is no Server Hardware provided for Red Hat Linux 7.2 Server for PCIS all over the sate , the old computers become obsolete and unavailable and new computers are not compatible with RH Linux 7.2 server.

Prescenario : challenges

- NIC district units also facing the similar problem of unavailability of hardware, software resources for Red Hat Linux 7.2 Server and Windows System with 4 GB of RAM for the sophisticated LRC applications of data uploading on web site, Agri Census etc.
  - Sophisticated, tedious, technical efforts, time and cost Consuming Technical installations and support for Red Hat Linux Server 7.2 and Windows client for PCIS, LMIS, Agri Census, 7/12 and Property Card data hosting on web site, for both LRC users as well as for NIC, district units.
  - This situation adversely affecting on service delivery, throughput, efficiency and cost

Solution: Motivation for Virtualizatoin

- **Need of efficient and optimized use of technical resources** (Hardware, software , network and human resources) due to limited availability for increased throughput , Improved Service Delivery and Cost Effective Framework for e-Governance in India
- **Use single computer system as a multiple computer Systems : running multiple OS simultaneously** : Instead of using traditional approach of running one operating system at a time on single computer system, the initiative is the innovative use of virtualization technology to run the multiple distinct OS at time on single computer system for resource optimization
- **Server consolidation:** Setting up distinct isolated client and/or server OS on the Single computer system to save the server hardware per location
- **All type of operations which physical computer system performs on file/folders as object using operating system, that Virtual Machine Software performs on complete virtual computer along with OS inside it as an object including creation, updating, removing, renaming, customizing , move, copy, backup and restore, sharing, Auto start, import/export etc.**
- **Software Hardware Portability:**
  - Sharing the same hardware among many software platforms
  - Allowing software to be "portable" between various operating systems, as well as running older software and OS on a newer computer.

Research Problem: Why this Research

- Research Problem : Why this research?

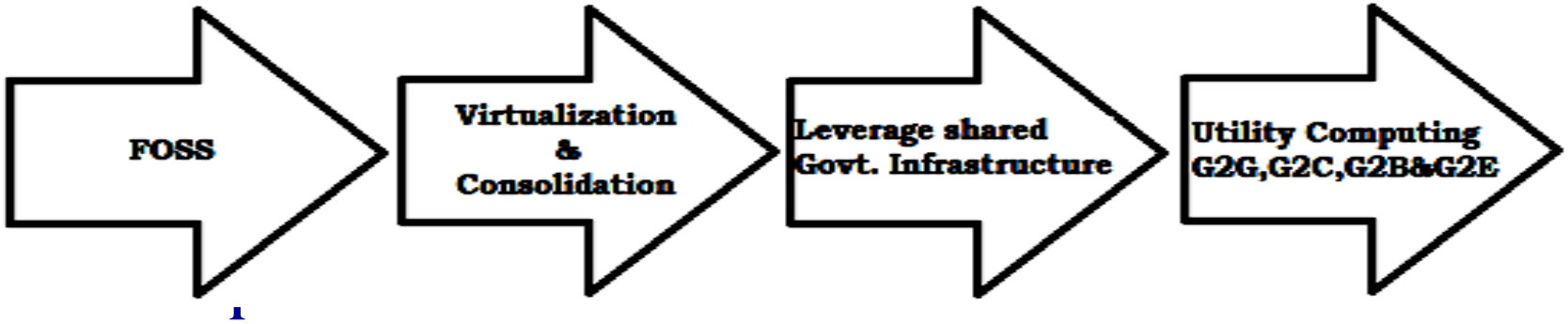
  Aim of this research is to study, use and analyze virtualization to facilitate the effective e-Governance which involves efficient and optimum use of technical resources for the improved service delivery, throughput, efficiency and cost effective solutions, and to provide concrete framework for e-governance in India

- Technique: Virtualization as Concept and Virtual Machine as Object

Technology : Steps towards effective e-Gov

Effective e-Gov is based on

- Free and open source software (FOSS)
- Virtualization
- Server Consolidation (to Save Server Hardware per location)
- Cloud computing (Live Virtual Machines virtually accessed by users remotely)
- Leveraging shared Government infrastructures



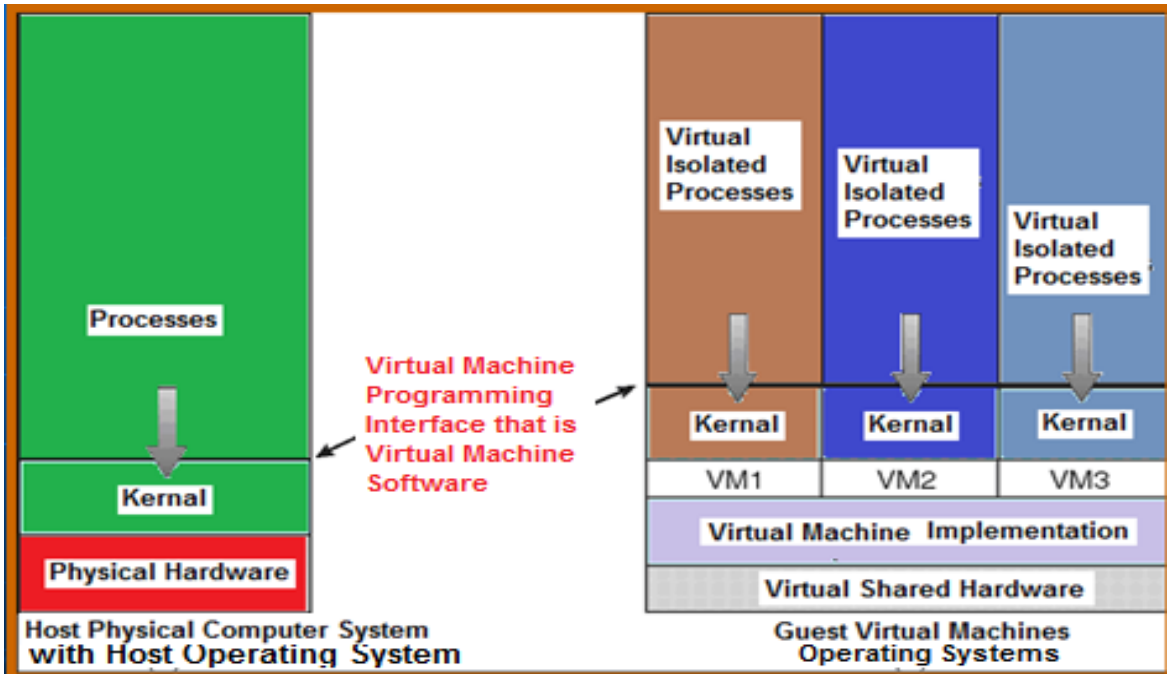
Business Process Reengineering (BPR)

- **Improved service delivery, throughput, efficiency and cost effective solutions , adaptability and scalability, new models of service delivery, efficiency & enhancement, user convenience, sustainability, leverage of shared Govt. infrastructure**

  Instead of traditional non virtualized approach of running single OS at a time, installations of OS and Application Software's, Data base and network configurations, installation of devices, data backup and disaster recovery, repeated deployments of sophisticated applications etc at large number of distinct locations, the broad innovative efficient and enhanced, user convenient approach of virtualization using Virtual Machines of isolated execution of multiple operating system at a time simultaneously on the single physical computer is adopted for the efficient and optimized use of the technical , financial and other resources to facilitate effective e-Governance by sharing and replications of complete OS instead of just files, distribution of sophisticated applications software of client / server completely working with OS. This way the single computer system is logically used as multiple computers with server consolidation and optimization of technical resources **and achieved improved service delivery, throughput, efficiency and cost effective solutions**

Technology Used : Virtualization using VM

Virtualization : Virtual Running of Virtual Computer on Physical



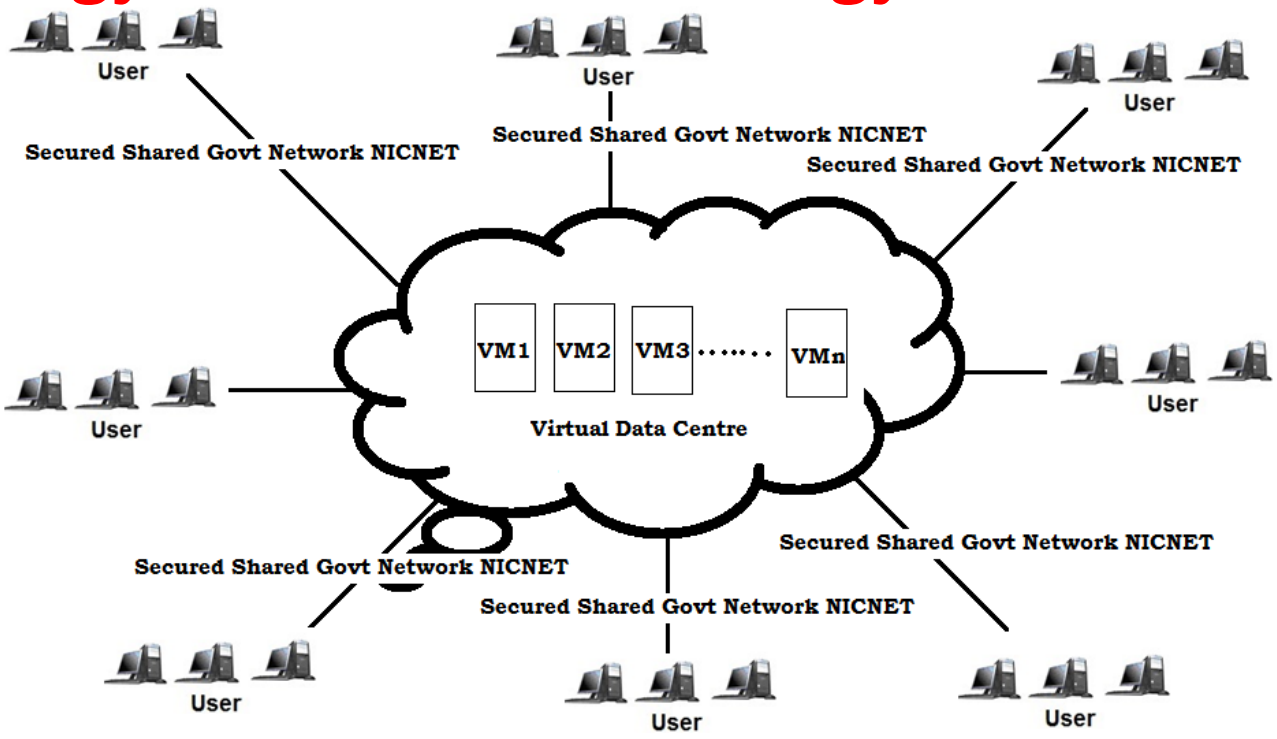
Logical Structure of Virtual Machine

Virtual Machine Logically divide single Computer System and resources into several isolated different sizes same like slices of the bread, each of which works and feels as a separate computer System / Server of different client / server Operating System and simultaneously run different isolated processes.

Virtualization means

- Virtual isolated execution of Virtually developed Machine(s) on Physical machine simultaneously.
- virtual isolated execution of the multiple software platforms (layers) on the same physical hardware simultaneously
- allows one computer to do the job of multiple computers, by sharing the resources of a single hardware across multiple environments

Technology Used: Methodology



- Developed Cloud of Virtual Machines of variety of OS Windows , Linux etc of variety of version, distinct server and client OS and physical machines, in order to use single physical computer virtually as multiple computer systems along with server consolidation.
- Investigated, implemented and analyzed functionality and utility of the VM's with Various Operations for our objective resource optimization with saving server hardware per location, increased throughput, Improved Service Delivery, effortless deployments backup & disaster recovery and Cost Effective Framework.
- Developed a Data Centre and hosted Cloud of VM's on it.
- Distributed readily distributable VM's Widely through Data Centre leveraging shared Govt. Network NICNET to the NIC District Units who has downloaded and implemented the same at their respective locations.

Post scenario & Major achievements :

Solved the major problems Faced by TILR, Tahsil and NIC Offices.

Major Problem was Unavailability, Maintenance of Server Hardware and sophisticated Deployments , diaster

The Problem of availability is solved by Server Consolidation by installing RH Linux 7.2 and Windows Client on non-compatible Single Physical Computer System. On Old and new Computer Systems and Laptops

Problems of Sophisticated deployments and disaster recovery is achieved by providing ready usable customized Virtual Machines and copying and replicating them on Variety of old and Computer Systems and Laptops.

Post scenario & Major achievements :

This way used ready usable Virtual Machines with server consolidation with optimization of technical resources and achieved improved service delivery, throughput, efficiency and cost effective solutions this way Saved technical and Environment Resources ,Technical Exercise, Server Hardware, Backup and Disaster Recovery, Testing and R & D.

Post scenario & Major achievements :

By copying and replicating the ready Virtual Machines, Optimized, efficient, enhanced, user convenient use of technical hardware, software, network and human resources with effortless deployments , backup and disaster recovery

- Saved Environmental Resources: By Server Consolidation and replicating VM's, used less number of equipments and optimized technical efforts and exercises, testing and saved variety of resources like time, financial, space, civil , electricity, furniture, fuel ,Vehicles, Human resources for taking the Computer Systems to NIC for support and for visits of NIC officials to Tahsil level environmental resources for timely completion of LRC PCIS, LMIS, Agri Census , 7/12 and Property Card Data Uploading ,e-Chawdi and e-Mutation, in the Districts of Maharashtra
- Reduced Pollution : By reducing the quantity of computer systems to large extent nearly 50% , significantly contributed in reduction of pollution in the form of Heat generated. By saving vehicles and fuel also reduced pollution.

Post scenario & Major achievements

- **Server Consolidation : Saved server hardware for around 500 locations by installing client and server on the single physical computer system.**
- Software hardware portability : Used the various features of Virtual Machines **between the large number of computer systems between host servers with distinct old and new compatible/ incompatible software's and hardware's**
- **The single computer system is efficiently optimally used logically as multiple computer systems with various distinct operating systems in hand running simultaneously at any time as guest using Virtual Machine Technique**

Post Scenario & Major Achievements

- Developed and distributed the cloud of variety of ready usable Virtual Machines including the server and client of LRC to districts in Maharashtra developing the secured stable ftp server, leveraging the Shared Govt. infrastructure NIC's 34/100 MBPS NICNET
- The technical implementation of this project "Virtual Machines" for LRC is smoothly executed with the optimum use of the available technical Hardware, software, network and human resources without any fund and expenses, hired staff with just a simple procedure and operational training of Virtual Machines to users.

Sustainability : All the achievements and technical implementation stable and useful so that it is irreversible and full sustainable.

Post scenario & Major achievements

Used **server consolidation** by installing Windows client and Linux server on single computer system to save server hardware per location.

Developed and distributed the cloud of variety of ready usable Virtual Machines including the server and client of LRC to District in Maharashtra developing the Secured Stable ftp server, leveraging the Shared Govt. infrastructure NIC's 34/100 MBPS NICNET

Capacity Building & Change Management:

- As the Vritual Machine software handles the Virtual Machine of complete OS just like a file for all similar operations almost no specific capacity building needed. Simple procedure of handling Virtual Machines using Virtual Machine software is provided and operational training with documentation of handling, backup and disaster recovery is provide to users in Akola and the same may have been provided to other districts users by the NIC district unit officials.

Adherence to eGov Policy

- **Distribution of cloud of ready Virtual Machines with secured stable ftp server, leveraging shared Government infrastructure NIC's NICNET with 34/100 MBPS high speed secured and stable lease line connectivity :**
  - **In order to use the Ready Virtual Machines the Stable , Secured ftp server is developed, and hosted the Cloud of ready Usable Virtual Machines of Red Hat Linux Server 7.2, Windows XP client for 7/12 RCIS, Property Card (PCIS), Windows XP and Windows 7 Ultimate X86, X64 and Windows 8 Professional 64 on the ftp server over leverage of Shared Government infrastructure NIC's secured and stable high speed NICNET Network 34/100 MBPS lease line connectivity for download and use by the District in Maharashatra.**

Evidence of Project Success

- **NIC Akola FTP Server logs** at link http://akola.nic.in/pdf/NIC%20Akola%20ftp%20server%20logs.rar

  As per the ftp server of NIC, Akola logs almost all the districts in Maharashatra has downloaded the ready usable Virtual Machines of NIC, Akola

- **Telephonic, Email and VC Communications from DIO's of Districts in Maharashtra.**
  - **In Mail Dt. 15 May 2013 ,Scientist D and DIO Wiashim Written as**

    "Thanks for ur help for virtual machines . At washim NIC we are using this virtual machine concept . 5 server .for property card and 3 server for 7/12 are in use without any problem . This concept had save money as well as time .thanks for ur cooperation and congrates for it ."

Evidence of Project Success :

- **In eMail Dt. 15 June Scientist E, Technical Director DIO, Beed written to SIO as**

"Respected Sir,

we are aware that hardware with Linux server supplied by Settlement Commissioner Office for Land Record Project was obsolete. But right now, it is mandatory to use Linux server for 7/12 Land record project for important phase of data conversion. For Beed district and for all 11 talukas, Linux server hardware was not in use because of hardware problem.

To install Linux server (Virtual Machine) for data conversion, DIO Akola helped us a lot and by using virtual machine server we started data conversion work with minimum effort. And because of virutal machine, the problem of Linux server get solved.

Whenever we stuck up for Linux server installation, Shri Nitiin Chaudhary, DIO Akola extended full support by taking control of server and made necessary installation. Now we are and Maharashtra state moving toward web based 7/12 under NLRMP "

Evidence of Project Success :

- **Email from NIC, Wardha Dated 31 July 2013**

-------- Original Message --------
From: **NIC WARDHA DISTRICT CENTRE** <mahwar@nic.in>
Date: Jul 31, 2013 1:44:43 PM
Subject: Usefullness of Virtual Machine concept.
To: NIC Akola <mahako@nic.in>

Dear Sir,

The virtual m/c concept was actually used in NIC, Wardha for creating server and client for 7/12 and property card computerization for 3 talukas-Deoli,Selu and Karanja.

Prescenario – In 7/12 and property card computerization project the server platform was Linux 7.2 and DB2 7.2 and client was windos XP. On the new machines Linux 7.2 doesn't get installed because it doesn't support new H/W therefore need was felt to create virtual server and client on through VM software on those new machines.

We have used virtual m/c created by NIC Akola for server and client for deploying on our machines. Deployment was easy through vm s/w and saved lot of time. Only data was needed to be restored for our talukas.

Post scenario- Client and server was delivered to actual user within one day after deployment and restoring their data back up. High user satifaction was achieved.

I would like to mention that DIO, DIA, NIC Akola put great efforts putting VM concept to use and worked for helping other DIOs of NIC in 7/12, property card computerization. They are only DIO, DIA who though of helping other DIOs by reducing their efforts.

I wish DIO, DIA, NIC, Akola success in their future technical endavours.

Regards.

Jayant Borade

DIA,NIC, Wardha

Evidence of Project Success :

- "**On 6th April 2013 at 11 am Video Conferencing is taken by Hon chief secretary Shri Banthia of Maharashtra on e-Governance with DIO's and district collectors of Maharashtra , in the presence of Shri Rajesh Agrawal , IT Sectretary Govt of Mahrashtra and Shri Moiz Hussain Ali, SIO, NIC, Mumbail**

Myself Shri Nitin V. Choudhari, DIO, NIC , Akola Informed the Following in the VC Session.

"Sir,

We have developed the Readily Distributable Virtual Machines of Red Hat Linux Server and Windows Client for 7/12 as well as Property Card and using it at District and Tahsils in Akola District and this way saved the server Hardware for all the Tahsils in Akola District for Property Card.

Our Virtual Machines of 7/12 and Property Card put on NIC Akola's ftp server and that are downloaded by around 15 Districts and Washim, Buldhana, Wardha Districts etc are using it "

During the VC Several DIO's informed that they are using the Virtual Machines of NIC, Akola

Hon Chief Secretary said that " The efforts taken by DIO, Akola are very much appreciated"

Conclusion: Key Learning

- Suggests a deigned framework to deliver the maximum throughput using technical resource optimization with improved and cost effective e-governance services.
- The involvement of technologies like virtualization, consolidation and cloud computing and adoption of free and open source software in designing and deploying e-governance will lead towards maximum throughput using resource optimization with reduction in total cost associated with both hardware as well as software. Therefore it reduces the financial burden abide by the state and central governments.
- For ensuring the effectiveness of e-governance projects the traditional framework and approach of delivery mechanism needs to be reengineered. The impact of any e-governance project depends upon its utilization by the concerned group and hence there accessibility needs to be enhanced drastically.

Note on Cost effectiveness

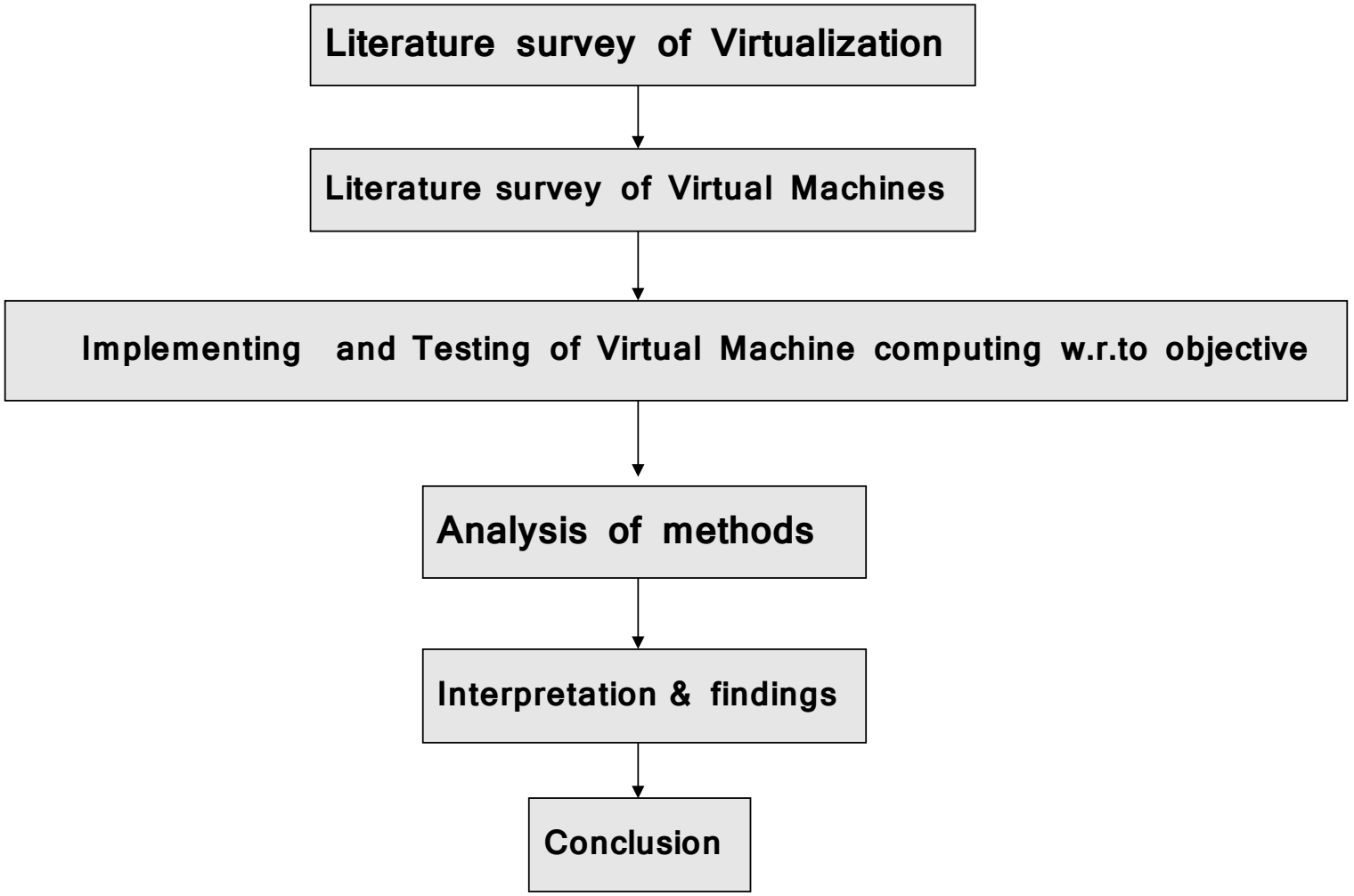
- By consolidating your server hardware with Operations Management, your organization can increase existing hardware utilization from as low as 5 percent to as much as 80 percent.
- You can also reduce energy consumption by decreasing the number of servers in your data center.
- VMware server virtualization can reduce hardware requirements by a 15:1 ratio, enabling you to lessen the environmental impact of your organization's IT without sacrificing reliability or service levels
- Server and desktop hardware consolidation can also help you achieve a 20 to 30 percent lower cost per application

Note on Cost effectiveness

- Used server consolidation by installing Red Hat Linux 7.2 Server and Windows Client on the single physical computer system and this way saved server hardware cost for around more than 500 locations / use.
- Saved approximate cost of around 1000000 Rs. for the maintenance of the sophisticated software / hardware, deployments of the Operating Systems, Applications software and Network and Database management, Disaster recovery , by replicating the ready usable Virtual Machines all over state with effortless deployments and backup and disaster recovery.
- Reduced hardware and operating costs by as much as 50 percent and energy costs by as much as 80 percent, saving more than 150,000 Rs. per year for each virtualized server workload.
- Reduced cooling requirements in establishment as well as maintenance of Government Data Centers (GDC's).
- Reduced total cost of ownership on e-governance projects by reducing the costs incurred on acquiring various types of hardware and software licenses from private vendors.
- Reduce the time it takes to provision new servers by as much as 70 percent.
- Decrease downtime and improve reliability with business continuity and built-in disaster recovery.

ROADMAP

« Concrete & Effective e-Gov Framework »
more from less for more & more


Literature survey of Virtualization
Literature survey of Virtual Machines
Implementing and Testing of Virtual Machine computing w.r.to objective
Analysis of methods
Interpretation & findings
Conclusion

Thank You

« Concrete & Effective e-Gov Framework »
more from less for more & more