



Design and Implementation for an Improved Version of Cloud Computing Architecture by using Concept of Ontology with Query Retrieval and Refinement Mechanism

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Abstract: The conception of cloud computing has been prevailing in minds of each individuals, business likewise as scientific organizations. The promotional material of cloud is at high pace. Technology has become thus advanced that the majority in operation systems square measure compatible to figure with cloud suppliers as a result of cloud computing is predicated on pay per usage and market bound policy. They supply facilities and simple accessibility to users for accessing resources in multiple environments. During this paper, varied aspects of cloud computing and its applications square measure conferred. The paper conjointly presents execs and cons of ANEKA-one of .NET application framework to develop cloud computing platform in multiple virtual setting likewise as physical setting. It's compatible with Windows and UNIX each. It describes varied programming models that convert applications into cloud application so facultative ANEKA cloud infrastructure in system. ANEKA is verified to be one in every of scalable and reliable technologies in cloud word.

Keywords: Cloud computing, Cloud services, ANEKA, Programming Models (Task, Thread, Map Reduce and Parameter Sweeping)

1. INTRODUCTION

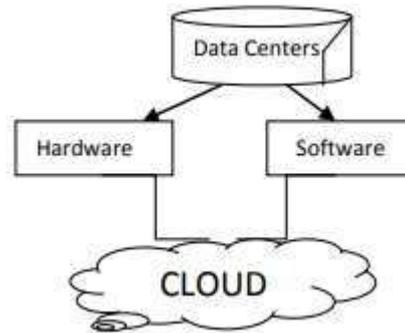
Before explaining regarding cloud computing, we have a tendency to initial outline evolution of cloud computing. The primary relevance

CLOUD was originated from phone trade in 1990's once Virtual personal Network (VPN) service was offered. Its following applications: (i) VPN eliminates the utilization of hardware information circuits between customers and producers. (ii) This service offers same quantity of information measure at lower price. (iii) it's compatible with ever-changing network from time to time. Reason of failure of VPN service: - (i) since network changes from time to time, thus it's uphill to predict path really. (ii) The computers connected through VPN don't seem to be ready to add multiple parts thanks to non-distributed and decentralised setting of hosts. It results in evolution of cloud computing that works in distributive environments with multiple sources of knowledge. Cloud computing is one in every of increasing trends in world of technology. It's given as name "dujour" says Gartner's mountain Prang [1]. It's massive concept that can revolutionize the modification in IT sector services. The result of cloud computing suppliers like Amazon, Google Docs {is conjointly is additionally} seen in mobile technology also. Victimisation these applications in mobile phones need less process quality as compared to victimisation them on computers. We have a tendency to use emails, galleries, Google apps, Microsoft live etc; of these square measure cloud platforms. Cloud Computing continues to be somewhere Associate in Nursing unknown conception {to varied to varied to numerous} researchers and



is plagued by various challenges that square measure listed below: i) information Protection: - information Security is one in every of major component that must be taken care of. Cloud vendors concern of losing confidential and identity of their customers. In cloud model, service supplier's square measure accountable for maintaining information security and enterprises got to believe them. (ii) Information Recovery and Availability: - All applications square measure designed by considering some laws or rules that square measure known as as Service level agreements (SLA's). There square measure groups designed to support information availableness at any time. These groups perform following tasks: information Replication System watching Maintenance Recovery from failure (iii) Management Capabilities: - though there square measure several multiple cloud suppliers, however management scale isn't satisfactory. There's nice got to improve on measurability and reconciliation options. The answer to the current drawback lies in ANEKA platform which will be seen in more section. The remaining section of paper is categorised as follows: Section two offers temporary introduction of cloud computing fundamentals so as to keep up link with more sections. It conjointly presents info regarding cloud worth additional services and their several layers. Section three describes introduction to ANEKA cloud computing platform and its options in cloud setting. Section four presents elaborated read of service bound design of ANEKA. It deals with varied programming models that are developed so as to attain property and dependableness in varied scientific organizations. Section five takes readers to achieve at conclusion and future scope of analysis.

2. CLOUD COMPUTING FUNDAMENTALS Cloud computing is regarding moving computing from single desktop or PC's to the net. Computing means that coordination, computation and storage of knowledge resources.



Cloud computing is combination of varied technologies like Grid computing, Virtualization, involuntary computing, omnipresent computing, P2P computing and plenty of additional. Time to time updating in existing laptop resources at varied information centres is one in every of the issue that LED to development of cloud computing. Another definition of cloud computing is outlined as a cloud could be a form of parallel and distributed system that consists of assortment of interconnected and virtualized computers (dynamically provision) and conferred united or additional unified resources supported service level agreements (SLA's) between suppliers and customers. Cloud computing performs services in ascending order i.e. we will use Associate in Nursing descriptor "ASC" that stands for Application, Storage and property.

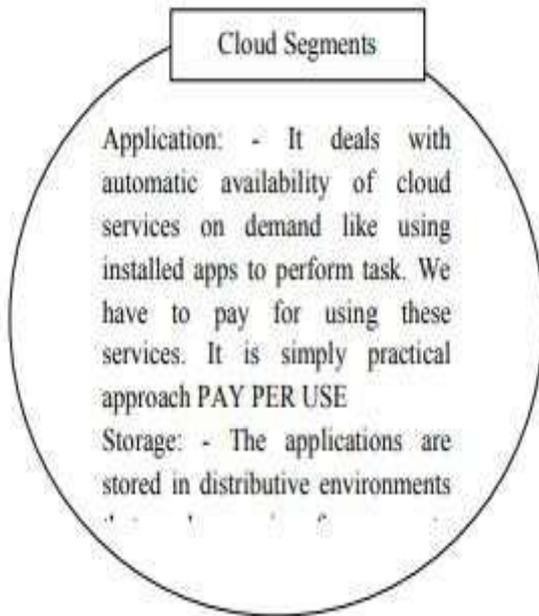


Fig 1: Cloud Segments Perspectives

Software setting or PaaS (Platform as a service):- Users of this layer embrace cloud application developers United Nations agency use applications to implement and distribute their resources via net. Developers square measure given programming language and set of API's. ANEKA is gift during this layer. alternative software system that's during this layer is Windows Azure, Mims etc. Application Layer or SaaS (Software as a service):- This layer acts as Associate in Nursing interface between cloud applications and finish users to supply them in demand. it's thus as a result of cloud users run programs by utilizing the process power of servers and it reduces hardware needs of machines. during this layer, we have a tendency to don't got to install software system on computers as all cloud software system is found in providers' information centres.

2.1 Cloud Computing Layers and their Services It consists of 5 abstraction layers: Physical Layer (Hardware as a Service):- it's bottom layer consisting of cloud suppliers, servers, in operation systems, devices and switches. Customers of this layer square measure massive industrialists United Nations agency needs great amount of hardware as service. It performs processing. software system Kernel: - it's second layer and acts as interface between HaaS and software system infrastructure layer. Haas performs processing whereas S/W infrastructure layer operates the hardware. This layer manages server's hardware resources and performs programs to run in parallel type software system Infrastructure (IaaS): - It provides network resources to 2 layers namely: software system setting and Application layer higher than it. This layer results in generation of latest software system environments and applications that may be delivered to finish users in variety of services.

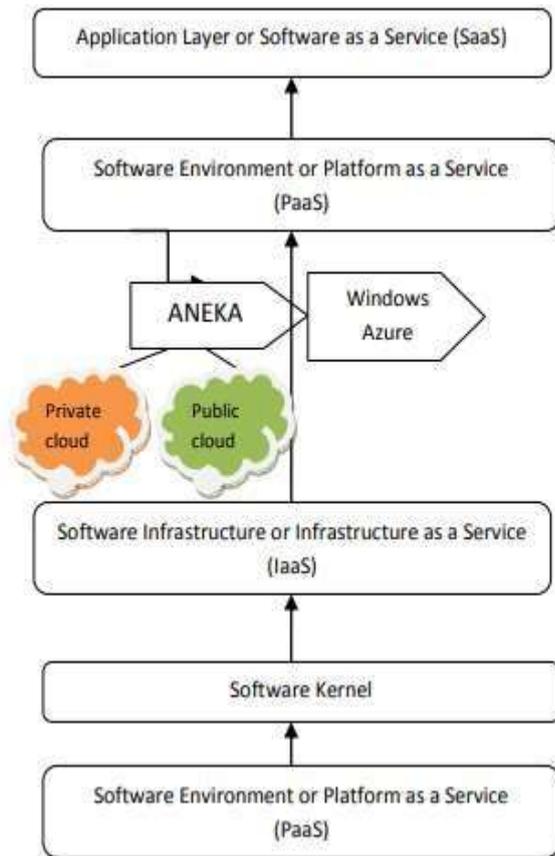


Fig 2: Position of ANEKA in cloud computing layers

3. INTRODUCTION TO ANEKA

ANEKA is one in every of platform that's wont to build, accelerate and manage distributed applications with the assistance of .NET framework. it's a software system that works on RAD (Rapid Application Development) setting to manage interconnected networks of systems. The word market bound in context of ANEKA specifies that it's potential to make, schedule, monitor results by giving some cash for victimisation IT services like Quality of Service (QoS) in each public likewise as personal clouds. The word ANEKA means that in many ways i.e. it's multiple programming models, multiple

programming methods, multiple authentication models and distributive setting for software. the most aim of ANEKA is to support open- ended set of abstractions and options for distributed computing and preparation situations. WHY ANEKA is out there solely IN PaaS LAYER? ANEKA is out there at PaaS in cloud setting. It implies that it provides programming application programming interfaces (API's) for developing distributed applications and virtual execution setting during which the applications developed as per API may be created to run. that ORGANIZATION GOVERNS ANEKA? MANJRASOFT Pvt.

Ltd. Is one in every of best corporations that works on developing future technologies for saving time and cash. ANEKA is one in every of its initial cloud computing technologies that employment on developing clouds victimisation .NET framework.

MANJRASOFT besides performing on future technologies conjointly develops software system compatible with distributed networks across multiple servers. It manages resources in cloud while not violating service level agreements (SLA's) so facultative less price, application programming etc. 3.1. options of ANEKA There square measure many options of ANEKA that helps in development of facultative cloud primarily based setting for quicker accessing of resources. (a) It consists of RAD tools and framework. (b) It combines with multiple virtual machines or existing machines to supply results of applications. (c) It uses provision interface so following parameters like Quality of Service (QoS) and SLA (service level agreements). (d) It supports multiple programming environments. (e) during this multiple applications may be dead at the same time that will increase utilization of resources. (f) it's conjointly capable of performing on UNIX base. (g) ANEKA means

that several forms. So, it's ability to supply alternative ways of operating in distributed network with the assistance of programming models like Task Model, MapReduce model and plenty of additional. (h) ANEKA is secure because it holds services within instrumentality. A instrumentality acts as middleware meaning it's middle a part of ANEKA framework. (i) Then there's Application level/ User level on high of middleware. it's totally different elements and tools to create development method easier, manage and monitors entire cloud setting. This security feature is additionally a part of middleware. (j) It utilizes desktop services conjointly to create powerful computing model. it's LED to reduction in infrastructure price of varied corporations and so reduces work by accessing resources through multiple computers at single time.

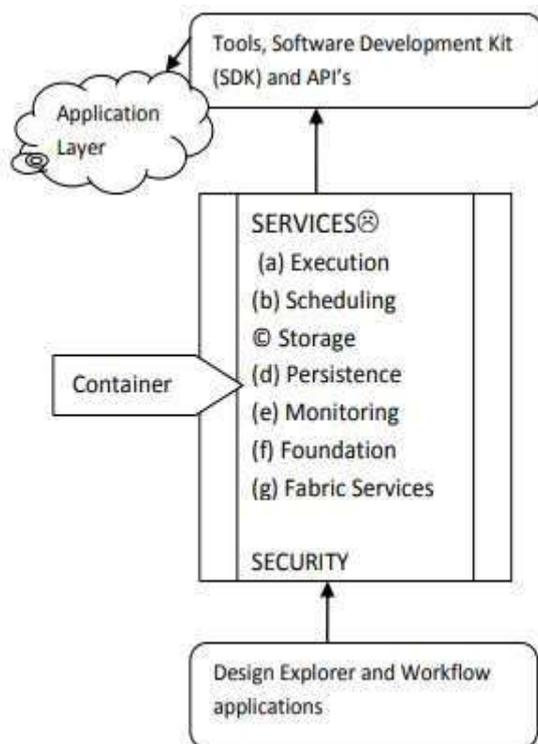


Fig 3: Overview of ANEKA environment

4. ARCHITECTURE OF ANEKA

The design of ANEKA is extremely scalable and reliable as a result of it contains separate modules for everything. ANEKA will solve some problems with cloud computing like management, security et al. it's in the main ANEKA Management Studio for providing work management and dynamic provisioning. it's multiple programming cloud models that square measure in the main used for mapping of resources to create them out there to purchasers. it's given ANEKA Application Module that plays very important role in real world applications of engineering, health, construction and plenty of additional. ANEKA depends on 3 functions:

(a) BUILD: - it's documented conception that for building one thing, there's would like of materials and alternative equipments. equally is case with ANEKA. For building setting in ANEKA, it's given software system Development Kit (SDK) that consists of varied API's and tools so as to make new applications or alter existing applications to run over multiple platforms. Multiple platforms mean heterogeneous networks. In alternative words, ANEKA ensures movability and relocability. varied API's and tools square measure listed below:

API's	Tools
Task Model (deals with batch applications)	Design Explorer
Thread Model (object oriented applications)	Workflow applications (used for programming)
MapReduce Model (used in data mining)	

ANEKA builds totally different run time environments like virtualized information centers (clusters), public/private cloud network and multiple computers.

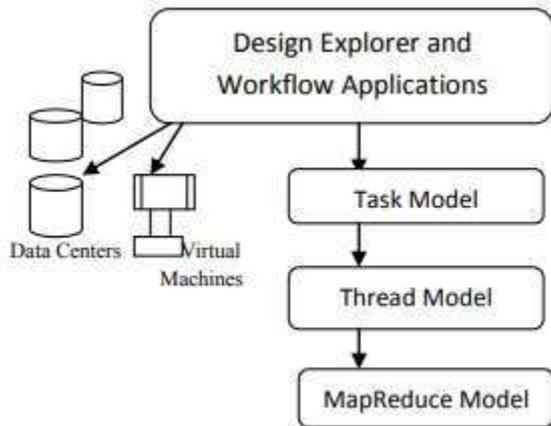


Fig 4: Part of ANEKA Cloud Platform

(b) Accelerate It includes development and deployment of applications in virtualized environments. In general ANEKA uses existing machines or systems to access resources but when demand of resources increases, then ANEKA uses deployment models of cloud computing like Private cloud services (VM Ware), Public cloud services (Amazon EC2). Process of Development and Deployment (i) Deployment includes use of Design Explorer tool by using parameter sweeping facility. Parameter sweeping means producing multiple versions of same application with different parameters by passing as command line arguments. (ii) Supports multiple language features that help to access resources from existing applications in faster time. (iii) This phase requires development of application only one time and then uses that application in multiple environments. It supports virtual machines as well as physical machines in cloud environment. (iv) ANEKA has scheduler that allows running of multiple applications at some time. (v) In case of large number of

applications, ANEKA maintains queue and put some applications in queue for further execution.

(c) Manage The process of ANEKA management includes GUI and API's to monitor and maintain clouds. It has also accounting module that manages resources as per user's priority and scalability on basis of SLA's. It makes use of dynamic provisioning. For managing process, ANEKA has

management studio as interface that performs following tasks: Quick installation of multiple clouds. Tuning and monitoring of system resources Monitors CPU performance by calculating utilization of resources. There are several other features like dynamic allocation of resources at run time in order to achieve high scalability, pay per usage service, allows flexibility and modularity in usage of resources an detection of services that are violating SLA's. ANEKA is one of first platform for developing applications on cloud. It utilizes extra CPU cycles in order to access desktop services from heterogeneous networks.

ANEKA cloud= Physical + Virtual Machines in distributed network

Each of these machines has saved resources that are stored in ANEKA container. The container provides basic management server that are divided into 3 modules:

Execution Services:- This module deals with scheduling of distributed threads among various processes to execute applications in cloud. Foundation Services: - They deals with monitoring of terms and agreements related to core system of ANEKA middleware thus enabling container by accepting their membership to perform particular task. Fabric Services: - They are directly linked to data centers (clusters) located in network and

perform dynamic provisioning. ANEKA cloud is combination of multiple resources connected to each other in a network. These resources can be modified as per user demands by using Virtualization. As we know that ANEKA has both private and public clouds. If resources are found in single host, then it is

private network. This private network can be extended to public network by maintaining interaction with other public cloud providers over the Internet. The detailed view of ANEKA architecture is shown on next page covering all modules and programming models in it.

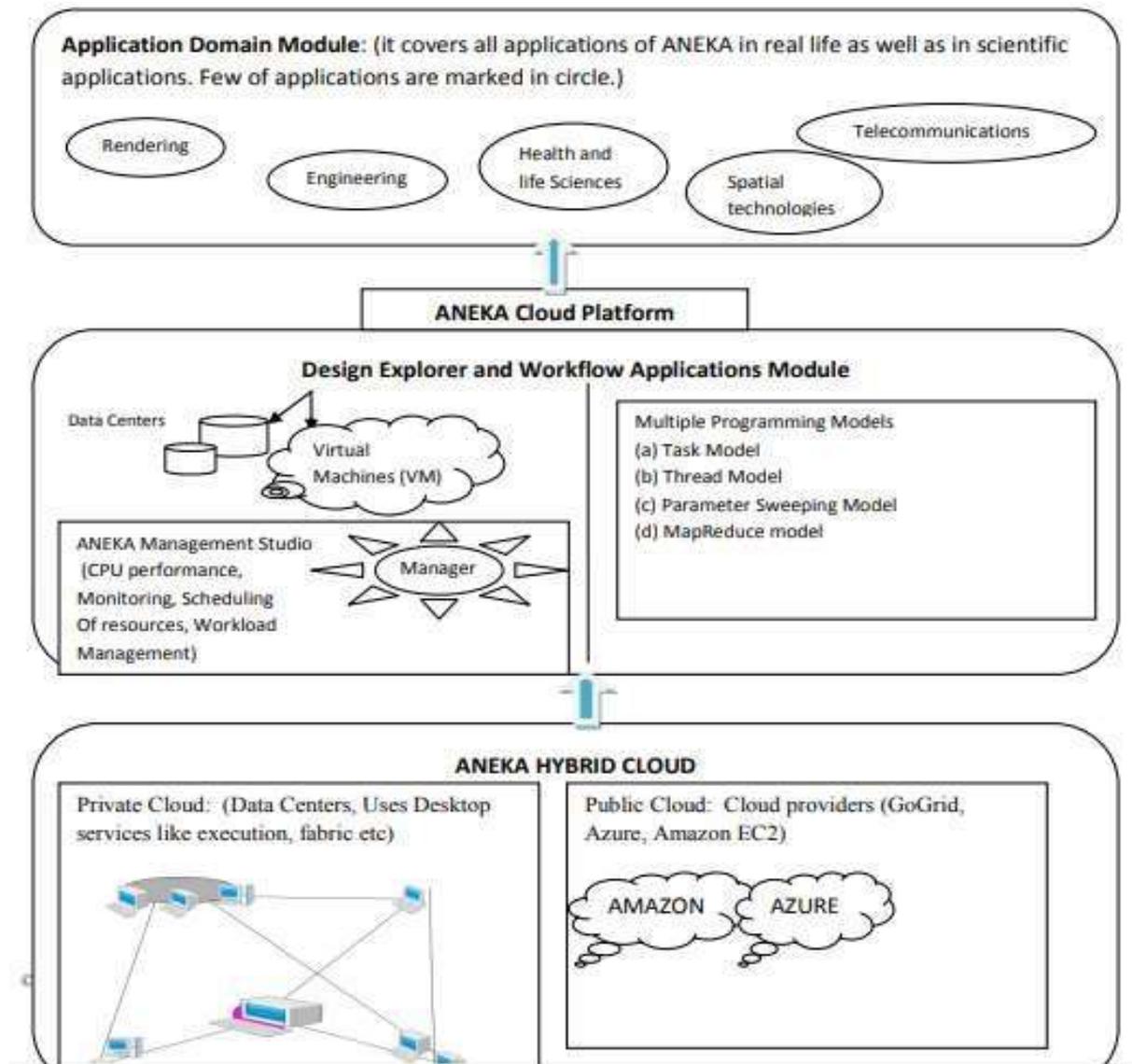


Fig 5: Detailed View of ANEKA architecture

4.1. Programming Models ANEKA consists of 4 programming models that plays major role in developing scientific and business

applications. The models square measure mentioned below:

(a) Task Programming Model Concept: It works on freelance tasks solely. The model is assortment of execution unit that's freelance of



others i.e. it means that answer of 1 shopper doesn't rely on answer of alternative purchasers. Operations: Submit and Forget Compatibility: User API includes Interface and Grid Task. Interface executes only 1 operation. Grid Task is employed for remote hosts. Middleware deals with task programming services and execution services. Application Manager:- Build task primarily based apps by doing steps: (i) making Grid application instance (ii) Implementing Interface tasks (iii) Submit task. Examples: Convolution, surpass Grid etc.

(b) Thread Programming Model Concept: Distributed setting threads. A thread is basic execution unit of system. Operations: begin, Stop, State question and be part of Features: Provides resources simply in distributed networks and multi rib applications. Compatibility: User API includes Grid Thread category for execution of remote hosts. Middleware deals with thread programming services and maintains schedule of objects created of Grid Thread category. Application Manager: - it's supported user views concerning cloud services provided to them. Build thread primarily based apps by doing steps: (i) outline employee methodology by implementing Grid Thread category. (ii) Performs publication of sophistication i.e. convert it into object and instances. (iii) produce and submit victimisation Grid instances. Examples: Benoit Mandelbrot

(c) MapReduce Programming Model Concept: Transformation methodology victimisation key values. The conception is outlined as remodeling initial values into list with its final values. it's known as Mapping. Reduction means that victimisation final worth of list beside its supply and reduces it to shorter term with new worth of list. Operations: Map ($\text{map} :: (\text{key1}, \text{value1}) = \text{list} (\text{key2}, \text{worth 2})$ cut back

(reduce: $(\text{key2}, \text{list worth 2}) = \text{list} (\text{value 3})$) Compatibility: Distributed applications User API embrace clerk and Reducer. Middleware deals with programming services (that monitors execution events of clerk and reducer) and execution services (builds execution platform for clerk and reducer like File Staging, task programming, Fault tolerance etc). Application Manager: - Build map cut back primarily based apps by doing steps: (i) outline map operation aboard category victimisation clerk (ii) outline cut back operation victimisation reducer in base category. (iii) Run MapReduce engine. Examples: Word Counter.

(d) Parameter Sweeping Model Concept: Uses conception of task programming model. it's {different|totally totally different|completely different} from task model in such some way that every one tasks square measure consistent as {they square measure|they're} subjected to different parameters and every one combos of values are tried to get task instance. Operations: similarity Compatibility: inheritance applications User API deals with small tasks like copy, delete and execute to compose interface. Application Manager: - Build applications by doing steps: victimisation style Explorer: It setup affiliation among servers victimisation Wizard.

5. CONCLUSION The paper takes USA to achieve at some conclusions. It deals with one in every of best cloud computing platform supported Microsoft .NET framework named ANEKA. The software system allows multiple applications and accessing of resources in distributed networks. It conjointly deals with basic introduction to cloud computing layers so as to spot position of ANEKA in cloud layer. it's created out there in Platform as a Service (PaaS) layer in cloud design. ANEKA provides security conjointly by following



service level agreements of varied cloud suppliers like Amazon, Azure etc. There square measure programming models of ANEKA that concentrate on management and programming of varied services like execution services, foundation services and cloth services. The model and their ideas are shown in paper. ANEKA is ready to figure with UNIX conjointly thus it's transportable and relocatable conjointly. It may be routed to totally different platforms.

6. FUTURE WORK: context of ANEKA, to make cloud world there's risk to implement user outlined programming model by analyzing basic models of ANEKA. Some steps may be helpful for planning user outlined model like first of all outline categories and their instances, give support for middleware that provides services to purchasers in one go. Treat categories as entities and instanced as information entity. opt for some model out of 4 models to keep up coordination between information servers. Then outline application logic and methodology. Implementation Execution

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