Department of Computer Engineering

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E-Newsletter

Sky Computing

Vision:

To empower girls of diploma computer engineering to excel in IT Industries and serve the society.

Mission:

- To strive for academic excellence and professional competence among students and staff.
- To encourage innovative ideas among students to enhance their entrepreneurship skills.
- To provide high tech educational resources and supportive infrastructure.

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Sky Computing

Cloud computing is the delivery of computing services over the Internet. Cloud services allow individuals and businesses to use software and hardware that are managed by third parties at remote locations. The cloud computing model allows access to information and computer resources from anywhere that a network connection is available. Cloud computing provides a shared pool of resources, including data storage space, networks, computer processing power, and specialized corporate and user applications.

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Sometimes, a single cloud isn't enough. Sometimes, you need the whole sky. That's why a number of researchers are developing tools to federate clouds, an architectural concept dubbed "sky computing".

Sky Computing is an advance deployment model and future of cloud computing where multiple clouds are integrated to serve the business processes at one place.

Sky Computing arises as a metaphor to illustrate a layer above Cloud computing, because such dynamically provisioned distributed domains are built over several Clouds. It can be described as a management up layer of an environment of Clouds, offering variable computing capacity and storage resources with dynamic support to real time demands. Laying a virtual site over distributed resources, combining the ability to trust remote sites with a trusted networking environment, originates a highly elastic response to incoming requests with a seemingly infinite pool of accessible resources.

Sky Computing is an emerging computing model where resources from multiple clouds providers are leveraged to create large scale distributed virtual clusters. These clusters provide resources to execute scientific computations requiring large computational power.

Establishing a sky computing system is challenging due to differences among providers in terms of hardware, resource management, connectivity and architecture.

Sky computing allows users to control resources on their own. So trust relationships within sky computing are the same as those within a traditional non distributed site, simplifying how remote resources interact.

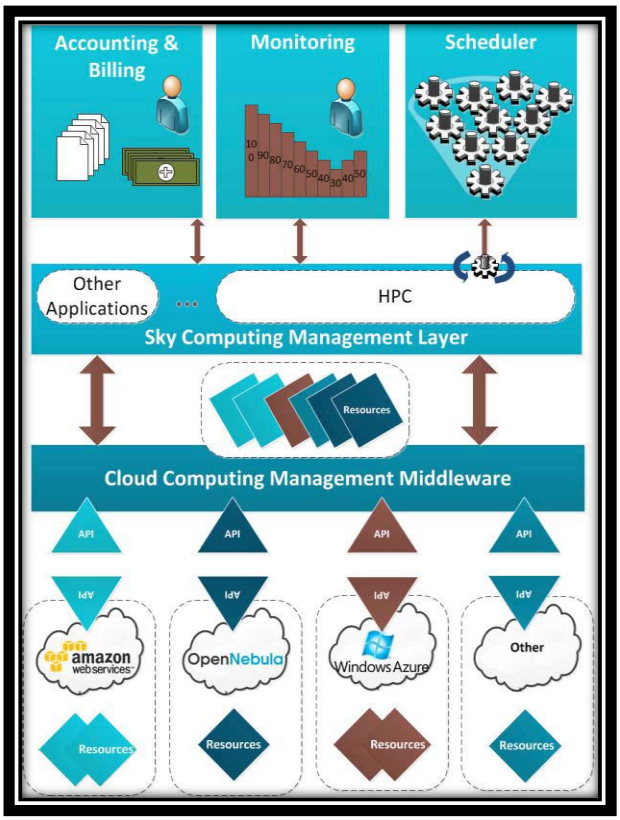
Sky Computing Architecture

The main idea is to create a turn-around model to enable intensive computing in Cloud networks. This is hoped to be achieved by enlarging the set of available resources in a way they overcome the problems referred before, like elevated latency between nodes.

As we can see in Figure, each Cloud provider has a specific API that makes available an interaction with their own resources. All these can be aggregated by a middleware layer, which allows controlling and managing resources by translating every command to the correspondent provider API. Abstraction, from bottom to top, is the key for building a consistent system. The upper layer, Sky Computing, integrates the last level of Infrastructure as a Service and the next layer of Software as a Service. This is a critical layer, as it must be as comprehensive as possible in features and capabilities. Here, our main focus is HPC, but is must be possible to deal with other applications too. Management, with scheduling, accounting and billing, should be well developed as well as Monitoring and Job submission.

Cloud Computing Middleware

Middleware is a very important and useful part in the chain value. It provides an abstraction that allows to develop applications without being tied to an explicit



Cloud vendor. The drawback is that API operations are limited (providers' operation set is larger) and can correspond to loss of performance. The Sky Computing management layer relies on the lower layer resources and interface, so it should be extremely stable and dependable. There are some projects undergoing for middleware, like the opensource libcloud , Deltacloud , jclouds , or fog, while others, like abiquous, Kaavo or Enstratius offer a more professional customized service and support, in exchange for a monthly fee.

Customizable Scheduler

A scheduler is a running daemon that coordinates the virtual requests and the available resources using different scheduling policies. It basically assigns to each Virtual Machine (VM) a physical host and a storage area depending on resource availability, obeying to pre-defined policies. Neither Delta cloud nor Aeolus have a scheduler, they make the deployment and rely on the destination Cloud's management.

Monitoring software

Monitoring is also a very important part of Cloud management. Probing the resources allows to register and control resource usage for a healthy running. For instance, detecting problems (out of memory, power off, overheat CPU, etc.) prematurely for an early resolution. Nagios is a monitoring system that enables organizations to identify and resolve IT infrastructure problems before they affect critical business processes. It delivers awareness of IT infrastructure's status and allows detecting and repairing problems and mitigating future issues before they affect users.

Accounting and billing

When providing users with a complex infrastructure like Sky Computing, it is crucial that the right usage is being kept for accounting and billing. Assuring a righteous accounting can make monthly usage use prediction, history analysis and the right planning for future use.

System assembling

The hardest part is to connect all pieces of the puzzle, thus it was successful. We managed to get Aeolus working with a hybrid infrastructure, featuring

Amazon and OpenNebula with a custom scheduler Haizea and Ganglia. The structure was functional and stable, however the lack of some important pieces reduced the structure flexibility and agility, despite the occasional improvement by a new tweaks on fresh software updates.

Characteristics of Sky Computing

Security and Trust

In the past, site owners couldn't trust a remote resource because they had no control over its configuration. Now that clouds let users control remote resources, however this concern is no longer an issue. Combining the ability to trust remote sites with a trusted networking environment, a virtual site can now exist over distributed resources.

Efficiency

Advances in processing, communication and systems/middleware technologies had as a result new paradigms and platforms for computing.

Flexibility and Scalability

The sky can quickly scale up to thousands of servers or services to make resources available as they are needed. Most cloud providers are extremely reliable in providing their services, with many maintaining 99.99% uptime. The connection is always on and as long as workers have an Internet connection, they can get to the applications they need from practically anywhere. Some applications even work off-line.

Resource management

Sky Computing facilitates the Implementation and realization of Emerging technologies to deliver Better Customer Experience with improved & realtime Interaction across the business operations to maximize the value for the consumer and stakeholders where sustainability can be achieved with increased profitability and competitiveness.

Flexible costs

The costs of sky computing are much more flexible than traditional methods. Companies only need to commission - and thus only pay for server and infrastructure capacity as and when it is needed. More capacity can be provisioned for peak times and then de-provisioned when no longer needed. Traditional computing requires buying capacity sufficient for peak times and allowing it to sit idle the rest of the time.

Benefits

- Single networking context -All-to-all connectivity
- Single security context- Trust between all entities
- Equivalent to local cluster-Compatible with legacy code

Challenges

- Inter-cloud resource creation & management
- Efficient inter-cloud communication
- Efficient distribution of tasks
- Fault-tolerance
- Adaptability to resource dynamicity

Sky Computing providers

Appliance Providers

Amazon was the first major cloud provider, Amazon Simple Storage Service (Amazon S3), Apple, Cisco, Citrix, IBM, Joyent, Google, Microsoft, Rackspace , Salesforce .

Cloud Broker

AWS Marketplace from Amazon, BlueWolf, CloudCompare, CloudMore, which offers cloud services aggregation and activation through partners.

SaaS:

SaaS Examples: Google Apps, Salesforce, Workday, Concur, Citrix Go To Meeting, Cisco Web ExCommon

PaaS:

PaaS Examples: EngineYard , RedHat OpenShift, Google App Engine, Heroku, appFog (aF) ,Windows Azure, Amazon Web Service(AWS).

IaaS:

IaaS Examples : Amazon Web Services (AWS), Cisco Metapod , Microsoft Azure, Google Compute Engine (GCE).

References:

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2. Mayuri S. Geed, Pallavi R. Gabhane & Prof. P. A. Manjare," Sky Computing: Extension to the Cloud Computing", Imperial Journal of Interdisciplinary Research (IJIR) Vol-3, Issue-4, 2017 ISSN: 2454-1362, http://www.onlinejournal.in

QUIZ (10)

Q. 1

Loop

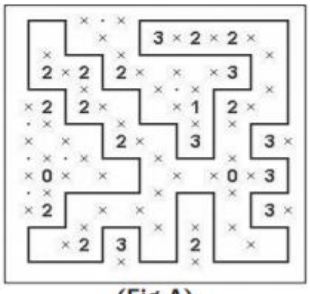
Rules

» Connect adjacent dots with vertical or horizontal lines, creating a single loop (Fig A). » Crossovers or branches are not allowed (As shown by dotted lines in Fig B). » Numbers in the puzzle indicate the number of lines that should surround it, while empty cells may be surrounded by any number of lines. » You can't draw lines around zeros. » Each puzzle has just one unique solution.

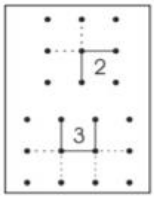
How to begin:

Example (Fig A) – Begin with the zero next to 3. Since no lines can be drawn around zero, mark crosses around it, as shown. Now there is a cross in one space around 3. So we know the three lines of 3 can only be drawn in the remaining three spaces. Next, these lines can only be extended in one direction each. Continue, using the same logic.

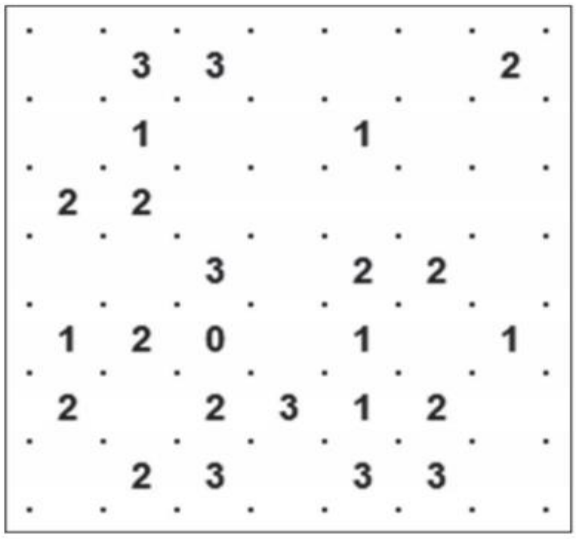
Hints: Keep eliminating possibilities by marking crosses in spaces between dots where a line isn't possible, i.e., if you have already completed required lines or where a line extension may create a branch or cause a dead-end (Fig B)



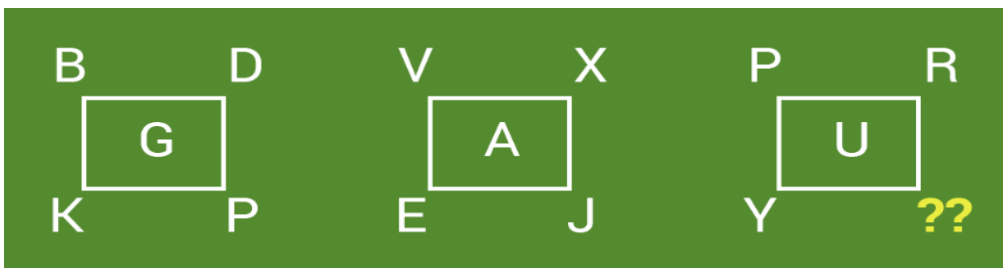
(Fig A)



(Fig B) Not Allowed



Q. 2 which letter should go into question mark space?



Answer of Last Quiz (9)

Q.1 Option A

L.C.M. of 21, 36, 66 = 2772.

Now, 2772 = 2 x 2 x 3 x 3 x 7 x 11

To make it a perfect square, it must be multiplied by 7 x 11.

So, required number = $2^2 \times 3^2 \times 7^2 \times 11^2 = 213444$

Q.2 Option B

Let the ten's and unit digit be x and $\frac{8}{x}$ Respectively.

Then, $\left(10x + \frac{8}{x}\right) + 18 = 10 \times \frac{8}{x} + x$

$\Rightarrow 10x^2 + 8 + 18x = 80 + x^2$

$\Rightarrow 9x^2 + 18x - 72 = 0$

$\Rightarrow x^2 + 2x - 8 = 0$

$\Rightarrow (x + 4)(x - 2) = 0$

$\Rightarrow x = 2.$

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