Agile Cloud Computing

A combination of 'Agile' and 'Iaas – a Cloud Computing Service model'

Dr. Satya Prasad Ravi
Associate Professor, Dept. of Computer Science & Engg.,
Acharya Nagarjuna University , Guntur, Andhra Pradesh,
India.

Rajasekhar Kilaparthi
Consultant in Information Technology,Scrum Master
and a Certified PRPC Senior System Architect

Lakshmi Sridhar Movva
Certified Scrum Master and Industry Consultant in
Information Technology

B.Reddaiah
Assistant Professor, Department of computer Applications,
Yogi Vemana University, Kadapa, Andhra Pradesh, India.

Abstract— Agile methods promote adaptive planning, evolutionary development and delivery, a time-boxed iterative approach, and encourage rapid and flexible response to change. Cloud computing is a model for enabling a convenient, simplified, on-demand network access to a shared pool of resources such as networks ,servers, storage, applications, and services. A combination of the Agile methodologies with Iaas (Infrastructure as a service)-a cloud computing service model, would help in betterment of delivery of the agile projects with a shift of workload focus from maintenance of infrastructure to innovation

Keywords:Agile,Scrum,cloudcomputing,Iaas,,cloud,Paas,Saas, Agile Computing,Infrastructure virtualization,,Multi Tenancy, Infrastructure as a service.

I. INTRODUCTION

Agile methods have been now widely popular and have been proved to be delivering high-quality software to the global users in shorter time frames and are effectively handling the continuous change on the requirements from the users. Agile methods promote adaptive planning, evolutionary development and delivery, a time-boxed iterative approach, and encourage rapid and flexible response to change [9]. However; given in a scenario if the projects are budget constrained , are to operate with high capacity severs with very good performance capabilities and having a fluctuating demand on the infrastructure during various phases; the timely unavailability of infrastructure can become a constraint and sometimes would be a major setback to the agile teams. Given the dynamic nature of the teams; the infrastructure should be available with in a short notice and due to the budget constraints the resources should be released as and when they are no more required and procured as and when required.

In this paper we propose the usage of Infrastructure as a Service (IaaS)-a Cloud computing service model on to the agile projects. To address the problem of the timely infrastructure availability, scalability, performance within the tight project execution schedules and budget constraints of the agile teams; we can utilize the cloud computing model effectively to reap the benefits provided by it. The usage of cloud computing on the agile team enables on demand access to the required pool of resources with minimal effort, ease of use and cost-effectiveness to the team and caters to the better execution of the agile projects.

II. AGILE SOFTWARE DEVELOPMENT

A. Agile software Development

Agile software development is a group of software development methods based on iterative and incremental development, where requirements and solutions evolve through collaboration between self-organizing, cross-functional teams. It promotes adaptive planning, evolutionary development and delivery, a time-boxed iterative approach, and encourages rapid and flexible response to change

B. Scrum

Scrum is an iterative and incremental agile software development method for managing software projects and product or application development.

Scrum contains sets of methods and predefined roles. There are 4 typical roles in Agile. Product Owner, Project Manager, Worker and Stakeholder.

- The *Stakeholder* is usually the instigator of the project or the investor.

- The *Product Owner* is the Stakeholder's representative. He is in charge of prioritizing the Backlog and Writing the User-Stories.

- The *Scrum Master* is a facilitator to the team. He organizes the team, removes impediments, oversees the process, and manages the Sprint backlog and the overall progress of the project.

- The *Workers* or *Scrum Team* are the ones getting things done. They estimate the stories in points and the tasks in hours. If the stories are estimated to be too big for a sprint, they can request the stories to be broken down by the Product Owner.

1) Sprint

A sprint is the basic unit of development in Scrum. Sprints last between one week and one month,[5] and are a "time boxed" (i.e. restricted to a specific duration) effort of a constant length.[7]

Each sprint is preceded by a planning meeting, where the tasks for the sprint are identified and an estimated commitment for the sprint goal is made, and followed by a review or retrospective meeting, [8] where the progress is reviewed and lessons for the next sprint are identified.

During each sprint, the team creates finished portions of a product. The set of features that go into a sprint come from the product backlog, which is a prioritized list of requirements. Which backlog items go into the sprint is determined during the sprint planning meeting and this becomes the sprint backlog.[5] During a sprint, the sprint backlog cannot be changed, which means that the requirements are frozen for that sprint. Development is time boxed such that the sprint must end on time; if requirements are not completed for any reason they are left out and returned to the product backlog. After a sprint is completed, the team demonstrates how to use the software.

Scrum enables the creation of self-organizing teams by encouraging co-location of all team members, and verbal communication between all team members and disciplines in the project.

A key principle of Scrum is its recognition that during a project the customers can change their minds about what they want and need (often called requirements churn), and that unpredicted challenges cannot be easily addressed in a traditional predictive or planned manner. As such, Scrum adopts an empirical approach—accepting that the problem cannot be fully understood or defined, focusing instead on maximizing the team's ability to deliver quickly and respond to emerging requirements.

III. CLOUD COMPUTING

Cloud computing is a model for enabling a convenient, simplified, on-demand network access to a shared pool of resources such as networks ,servers, storage, applications, and services.

A. How cloud works

In Cloud Computing, the resource sharing is in a pure plug and play model and it dramatically simplifies infrastructure planning for the organization giving the advantage of ease-of-use and cost-effectiveness of the resources. Cloud computing has the potential to transform a data center from a capital-intensive set up to a variable priced environment. The idea of cloud computing is based the principal of 'reusability of IT capabilities'.

In organizational perspective; the business needs to be agile to be competitive in the market—to respond to customers, partners, and suppliers quickly in the most quicker and efficient way possible. Cloud computing helps improvise the responsiveness, to quickly provision the resources to handle unforeseen customer demand .It further enables to release unwanted resources any moment to achieve cost-effectiveness. In Certain cases; the struggle to keep server capacity in line with business need is always around. It would slice the profits if you don't have enough capacity when the situation needs it. And it would cut into your profits if the system is build up with lots of unused resources in advance of the business need. Fluctuating capacity needs could also cause a situation of running out of required resources just when you need those most, hindering the ability to respond to the needs of customers. Also, having a set of idle, expensive servers that aren't contributing to the project needs is a burden to the organization and is a waste of investment. If the challenges of fluctuating capacity needs and server management coming on the way to act on business decisions, then cloud computing is a way to address the performance needs. Cloud services enable the movement at the pace of the ideas. The cloud lets you scale capacity and entire platforms quickly. Cloud services can provide incremental bandwidth of network access on demand to satisfy the customer's needs. The cloud allows creating a new computing environment quickly and pay only for services that are being used. Cloud is also ideal for random use, such as demonstrating product capability to a customer, or for seasonal usage of resources such as seasonal campaigning etc. The risks arising out of unavailability of the infrastructure can be be handled by the cloud and can be a part of the *Risk management in Agile*[12]

Managing servers can be a very resource-intensive task and diverting valuable IT time to data center chores which could compromise on the strategic projects aimed at driving new business opportunities. At the same time, servers can be costly to buy, house, and maintain. They take up a lot of space and business often must invest in a separate facility to hold them. The capital expenditure involved in housing and maintaining this could alter your business priorities and change your ability respond to customer needs. In such a situations leveraging the cloud computing capabilities would help the business to continue and focus on the business priorities. The cloud computing capabilities can also be leveraged to handle the non linear usage of resources in various phases of a project for e.g. Minor use of the resources in the beginning of the project, and massive use at the end.

B. The characteristics of Cloud

On-demand self-service

Broad network access.

Resource pooling.

Rapid elasticity

Measured Service

C. Service Models

Software as a Service (SaaS) :

Highly scalable internet based applications are hosted in the cloud and they are offered as services to the end user Example: Google Docs, salesforce.com

Platform as a Service (PaaS):

The platform for designing, developing, building and testing the applications are provided by the cloud infrastructure Example: AppEngine from Google, Force.com from Sales Force, Bungee Connect, LongJump, WaveMaker

Infrastructure as a Service (IaaS).

Services like storage, database management, and compute capabilities are provided on demand. This is a pay per use model. Example: IBM smart cloud, Amazon, Joyent, GoGrid and FlexiScale
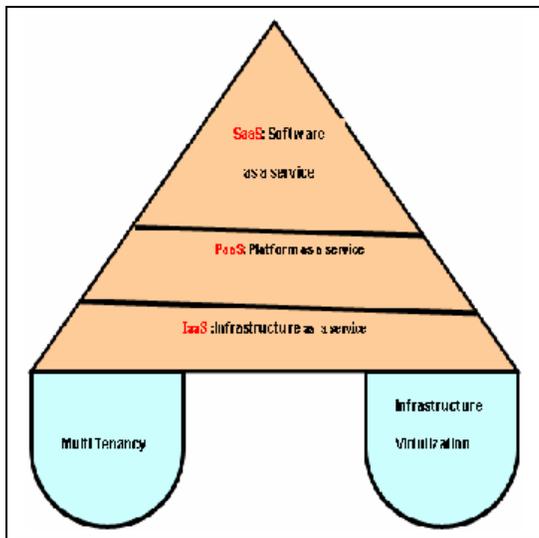

Figure 1.   Cloud Service Models

D. Deployment Models:

Private cloud

Private clouds are built exclusively for a single enterprise. They can be hosted either internally within ones one data centre or externally with a cloud provider.

Community cloud

Community cloud shares infrastructure between several organizations from a specific community with common concerns (security, compliance, jurisdiction, etc.).The cloud can be managed internally or by a third-party and hosted internally or externally.

Public cloud

Public clouds are owned and operated by third parties; giving each individual client an attractive low-cost, "Pay-as-you-go" model for sharing the infrastructure.

Hybrid cloud

Hybrid Clouds combines both public and private cloud models.

E. Some Cloud capabilities:

- Dynamically scalable infrastructure
- Self Service Management
- Pay per use

F. Some Cloud computing Benefits:

- Reduced cost
- Leveraging the scalable storage of the cloud
- Flexibility
- Resolves Performance Problems
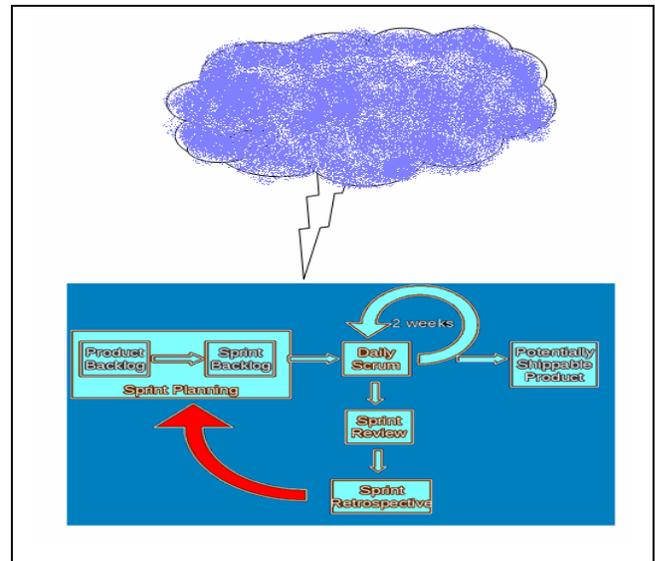
IV.   AGILE COMPUTING

Figure 2 :Agile Computing

In Agile development software is created by emphasizing short development cycles based on fast customer feedback. The methods are flexible enough to embrace change all the time and are capable of adapting to changes quickly with in less the development time .Agile methods have minimal planning and

do not involve long-term planning. Agile if provided with a crucial component: a development platform that takes care of all the infrastructure requirements which supports the rapid development cycles, can work towards the betterment of the agile project execution. The pace at which the customer requirement changes or the agile team responds to change at times would demand an availability of the infrastructure such as servers, network, storage etc with in short durations. The teams cannot wait for weeks to months for the infrastructure. Moreover the iterations with in agile methodologies would vary from 2- 4 weeks. So, the demand for infrastructure should be addressed in hours to few days rather than weeks to months as in traditional methods. If the projects operate in a strict budget constraints it would be more difficult to procure high end servers, storage etc.The unavailability of the infrastructure required would impact the fast moving, rapid developing agile teams to deliver the projects. Also using cloud computing would help workload focus from maintenance to innovation

So, the difficulties on the infrastructure front due to any of the reasons can be overcome by switching on to the cloud computing. We can say that there would be definite merit of using both the Agile methods and using the service model Infrastructure as a Service (IaaS) of the cloud computing together which we term it as Agile computing. Agile with cloud computing infrastructure as a service (IaaS) would provide rapid access to secure, enterprise-class virtual server environments and would be well-suited for development and test activities as well as other dynamic workloads that the agile team performs. The pay-as-you-go model minimizes the time and initial capital outlay needed to ramp up IT projects. Thus the combination of agile methodologies and cloud computing service model – Iaas (Infra Structure as a service) would collectively leverage the merits provided by each of them and works towards the betterment of delivery of the agile projects.

REFERENCES

.
[1] A. Powell, G. Piccoli, and B. Ives, "Virtual Teams: A Review of Current Literature and Directions for Future Research," ACM SIGMIS Database, vol. 35(1), 2004, pp. 6-36.
[2] S, Sarker and S. Sarker, "Exploring Agility in Distributed Information Systems Development Teams: An Interpretive Study in an Offshoring Context," Information Systems Research, vol. 20(3), 2001, pp. 16-20.
[3] Venkateshwara M and One-Ki(Daniel)Lee, "A New Perspective on GDSD Risk Management," IEEE Computer Society, 2010,pp.219-227.
[4] J. Kotlarsky, Management of Globally Distributed Components-Based Software Development Projects, in Rotterdam School of Management, Erasmus University: Rotterdam,2005.
[5]http://en.wikipedia.org/wiki/Scrum_%28development%29#cite_ref-schwaber_4-1
[6]http://www.planbox.com/resources/agile-artifacts#roles
[7]http://www.sprintplanning.com/SprintPlanningRules.aspx
[8] O.-K. D. Lee, P. Banerjee, K, H. Lim, K. Kumar, J. van Hllegersberg, and K. K. Wei, "Aligning IT Components to Achieve Agility in Globally Distributed System Development," Communications of the ACM, vol. 49(10), 2006, pp. 49-54
IEEE Transactions on Software Engineering, vol. 18(2), 2001, pp. 16
[9] Distributed Agile Development: Practices for building trust in team through Effective communication ,cscjournals.org -vol3 Issue2-IJSE-86.pdf by Dr Satya Prasad Ravi,Lakshmi Sridhar Movva and B.Reddaiah
[10] Kumar Saurabh,Cloud Computing Insights Into New-Era Infrastructure
[11]The Definitive Guide to Cloud Computing by Dan Sullivan
[12] Framework to mitigate dynamic and static risks with respect to agile - Dr. Satya Prasad Ravi,B.Reddaiah, Lakshmi Sridhar Movva

AUTHOR'S PROFILE

FIRST AUTHOR

Dr. R. Satya Prasad received Ph.D. degree in Computer Science in the faculty of Engineering in 2007 from Acharya Nagarjuna University, Andhra Pradesh. He received gold medal from Acharya Nagarjuna University for his out standing performance in Masters Degree. He is currently working as Associate Professor and H.O.D, in the Department of Computer Science & Engineering, Acharya Nagarjuna University. His current research is focused on Software Engineering. He has published several papers in National & International Journals

SECOND AUTHOR

Lakshmi Sridhar Movva is a Research Scholar in Acharya Nagarjuna University doing his Ph.d in Agile Methodologies under the esteemed guidance of Dr R.Satya Prasad. He has rich experience in IT industry and working as an Industry consultant. He is a certified Scrum Master and has been practicing Scrum in the projects he executed. He has completed M.Sc in computer Science from Acharya Nagarjuna University and M.Tech in Information Technology from Punjabi University.

THIRD AUTHOR

B. Reddaiah is a Research Scholar in Acharya Nagarjuna University doing his Ph.d under the esteemed guidance of Dr R.Satya Prasad .He is working as an Assistant Professor, Department of computer Applications, Yogi Vemana University, KADAPA, Andhra Pradesh. He has completed MCA from Sri Venkatesawra University and ME from Satyabhama University.

FOURTH AUTHOR

Rajasekhar Kilaparthi is a Consultant in Information Technology, Scrum Master and a Certified PRPC Senior System Architect. He has rich experience in IT industry. He is a Scrum Master and has been practicing Scrum in the projects. He has completed M.Sc in computer Science from Acharya Nagarjuna University and M.Tech in Information Technology from Punjabi University.