“Application Shopping Cart”

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A cooperative project between NTT DATA, Inc. and University of Texas Dallas
US Companies are continuously on the lookout for reduction of costs of IT services. Many avenues are used for reduction of those costs. A few are particularly attractive:

- Open source software
- Virtualization
- Cloud Computing, and most recently
- Containerization.

In this project, we will explore the interplay of those trends with the special emphasis on Containerization and the opportunity it provides for Shopping Cart like approach to procurement and delivery of business applications.
Virtualization or platform virtualization refers to the creation of a virtual machine that acts like a real computer with an operating system.

Software executed on these virtual machines is separated from the underlying hardware resources. For example, a computer that is running Microsoft Windows may host a virtual machine that looks like a computer with the Ubuntu Linux operating system; Ubuntu-based software can be run on that virtual machine.

Hardware virtualization can be viewed as part of an overall trend in enterprise IT. The usual goal of virtualization is to centralize administrative tasks while improving scalability and overall hardware-resource utilization.

With virtualization, several operating systems can be run in parallel on a single central processing unit (CPU). This parallelism tends to reduce overhead costs and differs from multitasking, which involves running several programs on the same OS. Using virtualization, an enterprise can better manage updates and rapid changes to the operating system and applications without disrupting the user. Virtualization dramatically improves the efficiency and availability of resources and applications in an organization. Instead of relying on the old model of “one server, one application” that leads to underutilized resources, virtual resources are dynamically applied to meet business needs without any excess fat.
• **Open-source software (OSS)** is computer software with its source code made available with a license in which the copyright holder provides the rights to study, change, and distribute the software to anyone and for any purpose. Open-source software may be developed in a collaborative public manner.

• The open-source model, or collaborative competition development from multiple independent sources, generates an increasingly more diverse scope of design perspective than any one company is capable of developing and sustaining long term.

• Open source software is most frequently free and readily available to anyone.

• Companies who spearhead the development of open source software benefit from the free contributions of outside developers and from sales of add on “enterprise” service.

• It is a standard belief that the availability of Open Source Software dramatically reduces costs of IT industry.
Cloud computing, is Internet-based collection of computing service, where shared resources, computers, computational services, data and information are provided to customers on-demand.

Cloud Computing, by definition, refers to the on-demand delivery of IT resources and applications via the Internet with pay-as-you-go pricing.

With cloud computing, you don’t need to make large upfront investments in hardware and spend a lot of time on the heavy lifting of managing that hardware. Instead, you can provision exactly the right type and size of computing resources you need to power your newest bright idea or operate your IT department. You can access as many resources as you need, almost instantly, and only pay for what you use.
Software Containers are light weight virtual machines.

Docker is an open-source project that automates the deployment of applications inside software containers, by providing a layer of abstraction and automation of operating-system-level virtualization on Linux.

Docker uses the resource isolation features of the Linux kernel such as cgroups and kernel namespaces, and a union-capable filesystem such as aufs and others to allow independent "containers" to run within a single Linux instance, avoiding the overhead of starting and maintaining virtual machines.

Using Docker to create and manage containers simplifies the creation of highly distributed systems, by allowing multiple applications, worker tasks and other processes to run autonomously on a single physical machine or across multiple virtual machines. This allows the deployment of nodes to be performed as the resources become available or when more nodes are needed, allowing a platform as a service (PaaS)-style of deployment and scaling for various software systems.
- **NTT DATA Application Shopping Cart** is a direct response by NTT DATA to clients’ demand for more flexible and leaner application delivery, based on technical capabilities introduced by Docker Containers and related technologies.

- Application Shopping Cart will be a Web Application displaying a list of Docker containers with fully installed and functional business and infrastructure applications. Applications will be organized and displayed in groups by type or by standard stacks in which they might participate.

- Every container, i.e. application in the shopping cart will be fully documented.

- Clients in need of a particular application or application stack will be provided with configuration screens which would allow them to configure every application and or stack to their needs before delivery.

- Once the client selects an application or a stack it will be able to transfer that application to its environment, whether an in-house server or Cloud
Essential Functional Requirements

- Centralized multi-tenant application and Docker repository serving many clients
- Supports the creation of hierarchies of applications and their versions
- Access to applications can be restricted to specific clients, users or user groups (roles)
- All “purchases” are logged in auditable trails
- New application stacks can be created by copying an existing stack.
- Docker container can be retired and remain in the Catalog but will not be visible to Shopping Cart consumers
- Users could interactively make proposals/requests for new applications and stacks.
• NTT DATA Shopping Cart will eventually support thousands of clients (companies in the role of NTT DATA customers) with tens of thousands of individual procurement officers).

• Shopping Cart needs to have a mixed appeal of a social media service and a procurement engine.

• Clients need to feel empowered to influence content of services rendered and to some extent the price of service.

• Customers should be able to incorporate procured applications (Docker Containers) both in on site environment and AWS Cloud.
Expected Deliverables

• An improved set of requirements (use cases) on the use of Shopping Cart, including
  • administrative tasks,
  • monitoring of service request fulfillment (state change),
  • notification and
  • high level reporting.
• Basic multi-tenant security infrastructure with
  • NTT Data administrator role,
  • Client administrator role,
  • Client procurement officer role
• A working Web application with proper handling of
  • authorization roles and
  • working reporting and
  • notification features.
• Backend facing middle layer could be developed in Java, Python or Go.

• Catalog Database service should be provided by SQL Server, Postgres or MySQL database

• Notification and Workflow management could be implemented using Amazon SNS and SWS.

• Container technology is Docker.
Skill Sets Needed

- Java programming
- Good CSS and HTML skills, possibly with one of HTML page design tools like Dream Weaver.
- Some knowledge of UML for creating modeling diagrams
- Database modeling (SQL Server, Postgres or MySQL)
- Amazon Cloud APIs for Simple Notification Service (SNS) and Simple Workflow Service (SWS)
- Dockers API