

# 8 Case-Study Related To Semantic Web

**Objective:**

This chapter consists of a case-study which can be converted into a full-fledged Semantic Web project. Students willing to take-up research projects on Semantic Web and studying this book with an aim to build a project can work on the case study.

## 8.1 An introduction to E-Commerce

**E-Business**

E-business is the application of Information and Communication Technologies (ICT) in support of all the activities of the business. E-business will be a secure, flexible and integrated approach combining the systems and processes that run core business operations. It is the process of using Web technology to help the streamline processes, improve productivity, increase efficiencies and enable organizations to easily communicate with partners, vendors and customers, connect back-end data systems and transact commerce in a secure manner.

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## E-Commerce

Electronic Commerce (EC) or simply e-commerce is an emerging concept that describes the buying and selling of products, services and information via computer networks, including the Internet.

### 8.2 Challenges to E-Commerce

Peer to peer approach plays a major role in developing E-Commerce to its fullest potential.

Following are some of the challenges faced by E-Commerce and Semantic Web solution:

- Mechanized support is needed in finding and comparing vendors and their offers. Currently, almost all of this work is done manually which seriously hampers the scalability of electronic commerce. Semantic Web technology can make it machine-processable.
- Mechanized support is needed in dealing with numerous and heterogeneous data formats. Various 'standards' exist on how to describe products and services, product catalogues and business documents. Ontology technology is required to define such standards better. Efficient bridges between different terminologies are essential for openness and scalability.
- Mechanized support is needed in dealing with numerous and heterogeneous business logics.

### 8.3 Current scenario

#### E-commerce business model

A Model is the systematic or structured approach which instructs the ways to be followed in order to perform a business activity. The business model spells out how a company plans to make money and how it is competitively positioned in an industry.

- A business model is a method of doing business by which a company can generate revenue to sustain itself. Organizations must define and execute a strategy to be successful in e-commerce.
- A business model that aims to use and leverage the unique qualities of the Internet and the World Wide Web is called E-Business Model.
- The components that are contained within a business model address all functions of a business, including factors such as the expenses, revenues, operating strategies, corporate structure, and sales and marketing procedures. (A company's policy, operations, technology and ideology define its business model)

#### E-commerce business model:

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## Key ingredients of a business model

- Value Proposition.
- Revenue model.
- Market opportunity.
- Competitive environment.
- Competitive advantage.
- Market strategy.
- Organizational development.
- Management team.

### 1. Value proposition

Value proposition defines how a company's product or service fulfills the needs of customers. It aims to answer the following questions –

- Why will customers choose to do business with your firm instead of another company?
- What will your firm provide that other firms do not and cannot?

### 2. Revenue model

Revenue model describes how the firm will earn revenue, produce profits, and produce a superior return on invested capital.

Following are the well-known e-commerce revenue models:

- Advertising model
- Subscription model
- Transaction fee model
- Sales model
- Affiliate model

- Advertising revenue model

In advertising model a company provides a forum for advertisements and receives fees from advertisers.

Example: yahoo

- Subscription revenue model

In subscription model, a company offers its users, content or services and charges a subscription fee for access to some or all of its offerings.

Example: Wall Street Journal

- Transaction fee revenue model  
In transaction fee model, a company receives a fee for enabling or executing a transaction.  
Example: eBay
- Sales revenue model  
In a sales revenue model, a company derives revenue by selling goods, information, or services.  
Example: Amazon
- Affiliate revenue model  
In an affiliate revenue model, a company steers business to an affiliate and receives a referral fee or percentage of the revenue from any resulting sales.  
Example: MyPoints

### 3. Market opportunity

- Market opportunity refers to the company's intended market space and the overall potential financial opportunities available to the firm in that market space.
- It is defined by the revenue potential in each of the market niches where you hope to compete.

#### Market space

Market space is the area of actual or potential commercial value in which a company intends to operate.



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#### 4. Competitive environment

Competitive environment refers to the other companies operating in the same marketplace selling similar products.

It is impacted by the following factors:

- Number of competitors who are active
- How large are their operations?
- The market share of each competitor
- How profitable these firms are?
- How they price their products?

#### 5. Competitive advantage

- Competitive advantage is achieved by a firm when it can produce a superior product and/or bring the product to market at a lower price than most, or all, of its competitors
- It is achieved because a firm has been able to obtain differential access to the factors of production that are denied by their competitors.

#### 6. Market strategy

- The plan you put together that details exactly how you intend to enter a new market and attract new customers is the market strategy.
- Best business concepts will fail if not properly marketed to potential customers

#### 7. Organizational development

- It describes how the company will organize the work that needs to be accomplished.
- Work is typically divided into functional departments.
- Move from generalists to specialists as the company grows.

#### 8. Management team

- Employees of the company, responsible for making the business model work, comprise of the management team.
- Strong management team gives instant credibility to outside investors. A strong management team may not be able to salvage a weak business model
- The management team should be able to change the model and redefine the business whenever needed.

### 8.3.1 Major E-business model

- Business-to-Consumer (B2C)
- Business-to-Business (B2B)

#### **Business to consumer business model**

- B2C (or Extranets) is just web-enabled relationships between existing partners. They are run by a single company seeking to lower the cost of doing business with its current suppliers or individual customers.

Examples:

Amazon.com, Egghead.com

#### **Business to Business**

- 'B2B' is business-to- business commerce conducted over the Internet (called B2B e-commerce space, or e-marketplaces)

#### **B2B applications:**

- Advertising
- Auctioning
- Procurement
- Channel management
- E-commerce

### 8.3.2 Unique features of E-commerce technology

#### **1. Ubiquity**

E-commerce alters industry structure by creating new marketing channels and expanding size of overall market. It creates new efficiencies in industry operations and lowers the cost of firms' sales operations. It also enables new differentiation strategies.

#### **2. Global Reach**

It changes industry structure by lowering barriers to entry, but greatly expands market at the same time. It lowers the cost of industry and firm operations through production and sales efficiencies. It also enables competition on a global scale.

#### **3. Universal Standards**

It changes industry structure by lowering barriers to entry and intensifying competition within an industry. Lowers costs of industry and firm operations by lowering computing and communication costs and enables broad-scope strategies.

**4. Richness**

It alters industry structure by reducing strength of powerful distribution channels. It changes the industry and firm operations costs by lessening reliance on sales force and enhances post-sale support strategies.

**5. Interactivity**

It alters industry structure by reducing the threat of substitutes through enhanced customization. Reduces industry and firm costs by lessening reliance on sales force and enable differentiation strategies.

**6. Personalization/Customization**

It alters industry structure by reducing threats of substitutes, raising barriers to entry and reduces value chain costs in industry and firm by lessening reliance on sales forces.

**7. Information Density**

It changes industry structure by weakening powerful sales channels, shifting bargaining power to consumer and reduces industry and firm operations costs by lowering costs of obtaining, processing, and distributing information about suppliers and consumers.



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## 8.4 Case study 1 – Implementing a Virtual Travel Agency in Semantic Web

### **Aim:**

To implement a Virtual Travel Agency in Semantic Web. Virtual Travel Agency (VTA) acts as an intermediary service between the customers and tourism service providers. The tourism service providers, here, will be commercial companies that provide flight, hotel, car-rental services etc. The output will provide tourism package to customers by aggregating services of various tourism service providers.

### **Description of the project scenario:**

Imagine a VTA which is an end-user service, providing e-Tourism services to customers. These services can cover all kinds of information services concerned with tourism. For example, information about events and sights in an area, services that support booking of flights, hotels, rental cars, etc. Such VTAs exist even now in the market. Currently, those portals are accessible via html sites. The partners of the VTA are integrated via conventional B2B integration.

By applying Semantic Web Services, a VTA will be easily able to configure and invoke Web Services provided by several e-Tourism suppliers and aggregate them into new customer services. Such VTAs providing automated e-Tourism services to end users via different interfaces and can be more easily reconfigured according to the actual needs.

Our VTA aggregates Web Services of different tourism service providers. In a nutshell, it provides the following functionality:

A customer uses the VTA service as the entry point for his requests. The end-user services are aggregated by the VTA by invoking and combining Web Services offered by several tourism service providers. To facilitate this, there can be a so called “umbrella” contract between the service providers and the VTA for regulating usage and allowance of the Web Services.

### 8.4.1 Drawback of the current system

- Current VTAs maintain the data in their own database. The offers that we get are just from the fixed set of services that they acquire by collaborating with different service providers.
- The service providers do not directly come in contact with the customers with their own set of offers. This is because of the variation in the format of the database used by these service providers. For example the field name for “product identification number” may be “prod\_id” in service provider-1’s database and “product\_id” in service providers-2’s database.
- Hence it becomes difficult to integrate these services together and provide a consolidated package to the customer.



#### 8.4.2 What the target system does?

- The target system will retrieve the services from the database of the service provider itself instead of retrieving it from the database maintained by the VTA.
- This is done by Ontology mapping which maps the field names with their appropriate meaning and different possible field names.

#### VTA's services:

A Web Service of a VTA offers end-user services for searching and booking hotel and flight tickets. This Web Service is composed of other Web Services, namely accommodation and transportation services that are provided and published by different companies and are registered with the VTA.

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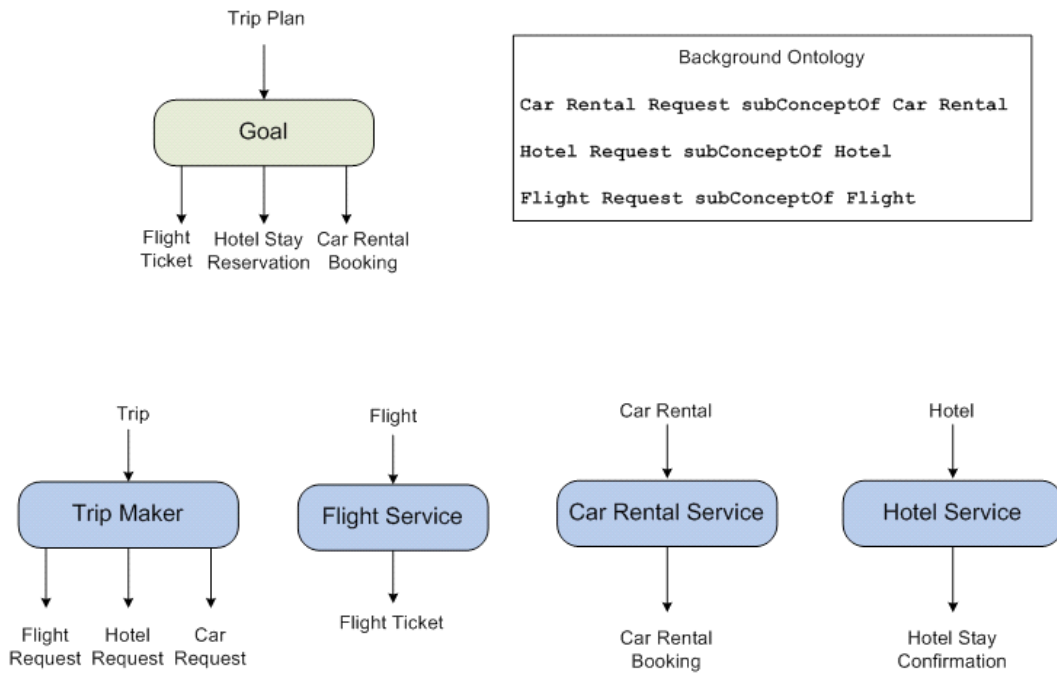
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Expected Plan

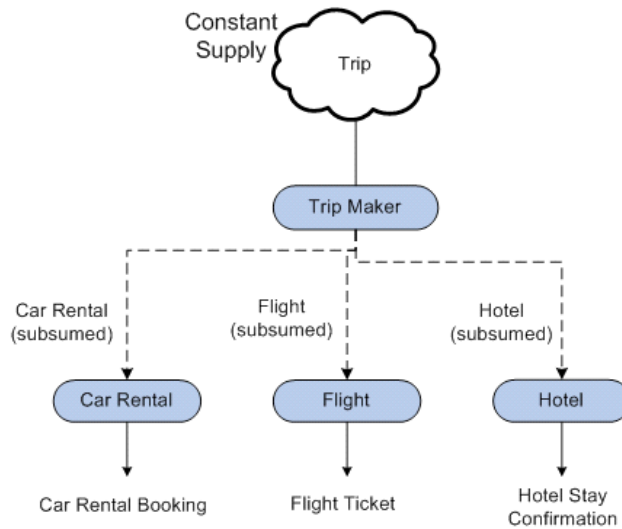


Figure 8.1: Expected output of VTA.

### 8.5 Architecture of the proposed system

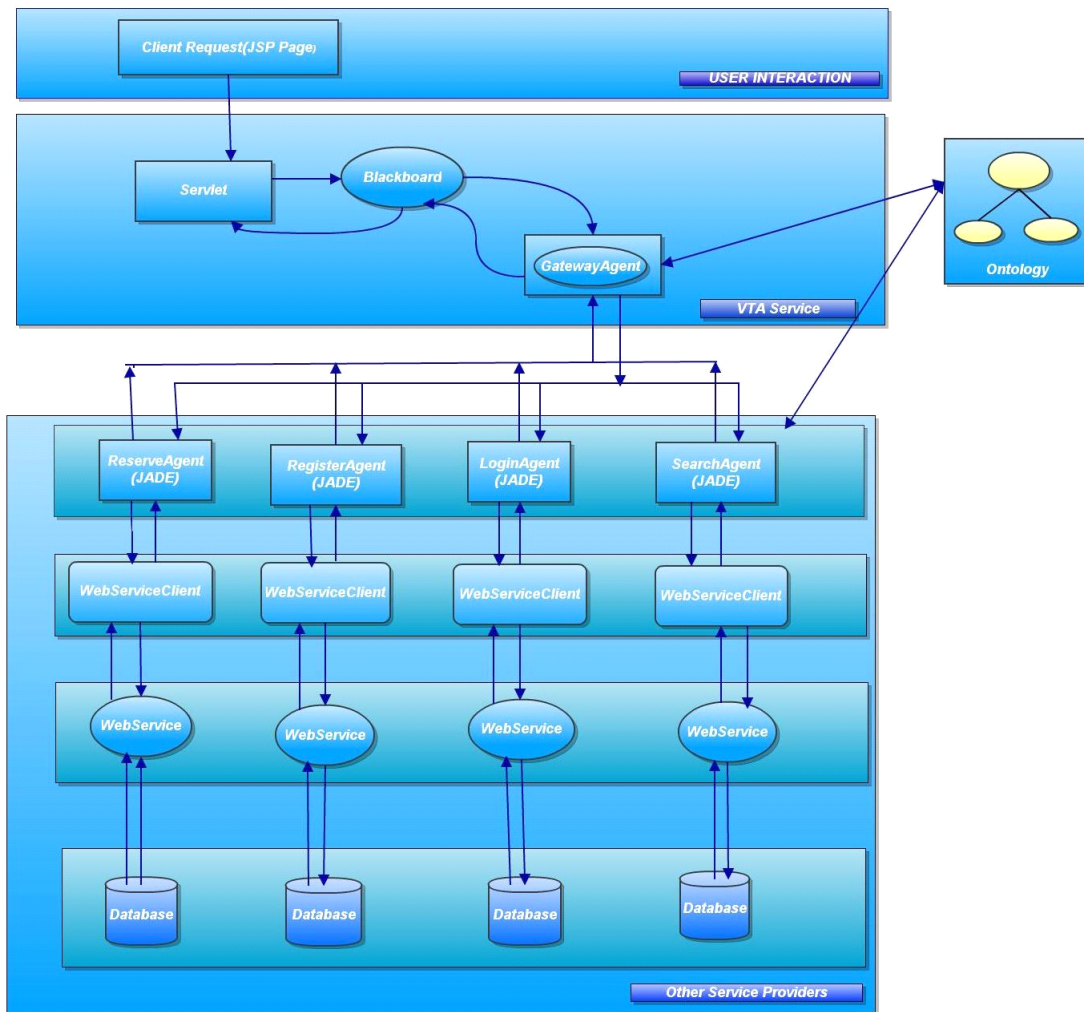


Figure 8.2: VTA Architecture.

#### Technologies to implement VTA:

- JADE
- HTML 5, CSS, Java script
- Servlets

**JADE:**

JADE (Java Agent Development Environment) is a middleware that facilitates the development of multi-agent systems. It includes

- A runtime environment where JADE agents can “live” and that must be active on a given host before one or more agents can be executed on that host.
- A library of classes that programmers have to/can use (directly or by specializing them) to develop their agents.
- A suite of graphical tools that allows administrating and monitoring the activity of the running agents.

Each running instance of the JADE runtime environment is called a Container as it can contain several agents. The set of active containers is called a Platform. When an agent A communicates with another agent B, a certain amount of information I is transferred from A to B by means of an ACL message. Inside the ACL message, I is represented as a content expression consistent with a proper content language and encoded in a proper format. Both A and B have their own way of internally representing I. Hence it's clear that each time agent A sends a piece of information I to agent B, A needs to convert his internal representation of I into the corresponding ACL content expression representation and B needs to perform the opposite conversion. Moreover B should also perform a number of semantic checks to verify that I is a meaningful piece of information. The support for content languages and ontologies provided by JADE is designed to automatically perform all the above conversion and check operations

**Process:**

In the browser the user creates an event and it generates a POST message. The servlet handles it and the “sendmessage” action is invoked. The action creates a new BlackBoard object which will be the message channel between the GatewayAgent and the servlet. The GatewayAgent gets the dashboard object created previously and extracts the recipient and the message. After that, it sends the message. ServerAgent who is now the recipient, responds to the GatewayAgent. ServerAgents referring to the ontological description invoke appropriate client web service that in turn invokes the web service on the service providers' domain that retrieves result from its database and passes it on. When it reaches the GatewayAgent, the GatewayAgent packs the reply and sends it via BlackBoard to the servlet. The servlet forwards it to the browser.

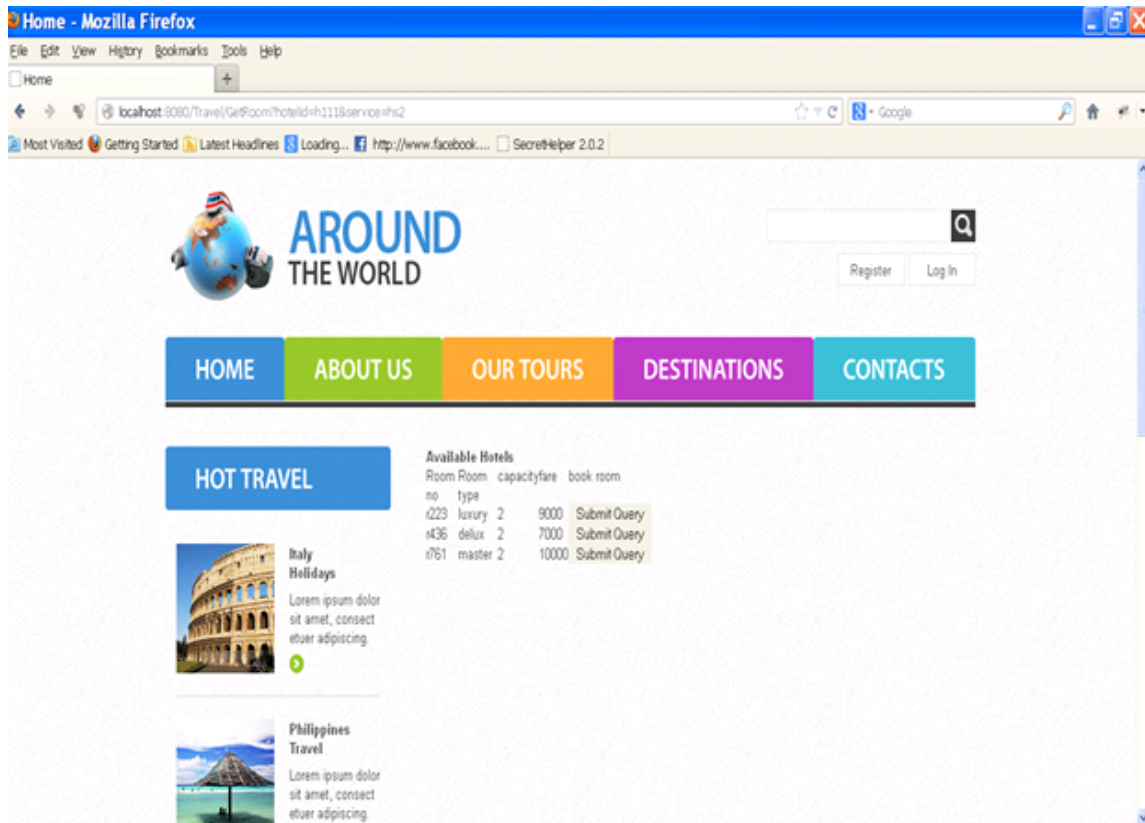


Figure 8.3: Sample output of VTA.

**Conclusion:**

Thus, we can conclude that this budding technology has a lot of scope. The only problem it faces is that all the tools and interfaces developed to implement services in Semantic Web, such as WSMT (Web Service Modeling Toolkit), are all at their rudimentary stage of development unlike tools in Web 2.0 such as Netbeans which are already well-developed and ready to use. Hence the conclusion is that, if we are able to concentrate more on developing these tools into a full-fledged interface, this technology of Semantic Web can come out with wonderful inventions.