Chapter 1: Introduction

1.1 Advancement to Present State: Fundamental Aspect

The World Wide Web has become the greatest repository of information ever assembled by man. Now there are several billion documents on the web, which are used by more than 600 million users over the world (ClearLead)\(^1\) as a result, the Web has become world-wide source of information and a mainstream business tool (Spink)\(^2\).

It contains documents and resources concerning almost every imaginable subject, and all of this data is instantaneously accessible to anyone with an Internet connection. Nevertheless, the success of the Web greatly drives the traditional commerce transformation. Today through the Internet, business and consumers from different countries can interact as easily as if they were physically close to each other. This borderless aspect of international electronic commerce and online interaction creates a wider marketplace that has simplified transactions and business relationships.

The web development drives businesses to be faster and more efficient. However, in case of traditional online examination there are still some hurdles because of which it’s difficult to achieve some tasks (e.g. product recommendation, automatic business processing and so on) due to these restrictions. People want online commercial activities should be carried out more (Tim Berner Lee)\(^3\) autonomously with minimal human intervention, this requirement poses a challenge to the web community to develop an infrastructure that could provide the meaning of web resources and support the semantic level inter-operability.

Fortunately, research of the next generation Web, the Semantic Web gives a new opportunity and perspective to the conventional Online Examination. The Semantic Web is a W3C driven major development aiming at improving the state of the World Wide Web through the use of semantic technology (Antoniou)\(^6\). The basic idea is to enrich the current Web with machine interpretable information about the meaning (semantics) of web contents. With the semantic web, a fundamental meaningful web environment could be created for the computer to deploy the automatic and intelligent services.

In this thesis, which aims for semantic web based online examination; we have attempted to study the semantic web technology applied in the realm of online examination. In detail, we propose a Semantic Web-based Online Examination framework (SWbOEF), and A practical
credit card recommendation tool is built on this framework, through the study project, an investigation is carried out, which demonstrates how semantic information improves on the growing Online Examination infrastructure by adding capability matching and a high degree of autonomy.

1.2 Motivation

The motivation of the present endeavor is the ability to automate and streamline the analysis and reasoning process of any digital investigation. The situation is current Web contents were originally designed only for people to read, not for computer programs to meaningfully manipulate. The traditional Web services can transfer data, advertise them, and is discovered by users. The computer can parse Web pages to obtain the layout information, process sequences in the header, and link to another Web page. However, it has no reliable way to process the semantics in the WebPages. Therefore, the traditional Web technology doesn't have the capacity to assist users to process the sophisticated commercial Web services.

Fortunately the Semantic Web, as an extension of the current Web, achieves a metadata layer adding on the existing information pool. And the metadata layer is made of machine processed data. Thus the higher level services (such as, conceptual search and semantic recommendation) can be made on this metadata layer. Then the Semantic Web is able to implement the semantic interoperability than the syntactic Identification. Meantime the Semantic Web not only uses ontology’s acting as shared knowledge bases across the Web, but also supports logic to help knowledge inference. Therefore the Semantic Web will bring a new opportunity in enhancing the learning and grading online through virtual semantic web based system.

1.2.1 Principle Advantages of the system:

This proposed online website for Examination will remove the flaws of existing Manual Systems like:

i. Reducing the manual labour (decrease in overheads).
ii. Avoiding mistakes due to human error (higher accuracy level).
iii. Will increase efficiency and save time.
iv. Will allow neat handling of data rather than error prone records
1.3 Objectives and Methodology

The principle research object is around the investigation of the Semantic Web applied to enhanced learning System. As a study project, we propose a Semantic Web-based Enhanced learning System framework, which greatly increases the service quality. For reaching this purpose, the study work is carried out as follows:

- Systematically studying the Semantic Web technology. The study content includes the Semantic Web concept, theory foundation, developing technology and tools and application domain.
- Investigating and evaluating the current online examination with question paper weight-age systems. This work helps us to find out the existing problems and relevant reasons. Besides, as the research start point the traditional online examination architecture will be investigated in detail.
- Designing a Semantic Web-based online examination framework which integrates the Semantic web into the existing online examination Architecture. In this framework, not only the online examination resource information could be represented semantically; but also intelligent web services would be achieved via the semantic reasoning.
- Formulating the work flows for the designed framework construction. Detailed workflow steps will be illustrated as the roadmap for developing different modules in the framework.
- Studying the key technologies related with certain workflow steps. This work offers a theoretic support and practical method for realizing the Semantic web-based online examination.
- Choosing a concrete online examination service as the application example. Implementing the application tool based on the Framework. The main objective is to develop a methodology and enhance a virtual semantic web based system to enhance learning and grading online.

A website on weightage, ONLINEEXAMS4U is to be designed to conduct online tests.
Unlike other online examination systems this website should not be just for the students; instead it should also provide facility for faculties & Institutes to host online Tests/Exams and provide a question paper. This will help institutes in:

- There will be no need to get new software every time to conduct an online test.
  - Also like other online websites, it will help students by:
    - Saving the extra time of going too far away from Exam Centre.
    - Students need not wait for their results as they will get the online scores immediately thereafter.

Also this website will remove the flaws of existing manual systems like:

- Reducing the manual labor (decreases overheads) avoiding mistakes due to human error (more accurate), will increase efficiency and save time.
- Will allow precise handling of data rather than error prone records. The institutes will register themselves with a unique login name and password; the unique id will be issued to the institutes by the website.

After login:

- They will enter exam details like number of questions, positive and negative marks.
  Then they will enter the questions along with the answers which can later be deleted and edited.
- Also they will enter the list of eligible candidates with their id names which can also be edited later.
- Institutes will be able to view the students list along with their respective results.

Also for students:

- They should be able to login with their id; name and institute id.
- They should be able to give the exam as per the details entered by respective institutes.
- They should be able to view their score after test finishes. If already given the test then they should just be able to view their scores.

Major problems may arise in the case of multiple parties being involved in the analysis of a security event due to different levels of expertise or communication problems that may arise from a lack of an agreed set of terms and definitions. A final side-problem identified is
focused on the presentation level as being an important component of almost all data flow (DF) investigation models. The results of a DF investigation may have to be communicated to a court’s jury or an organization’s decision making body in a more understandable manner.

**Process:**
The institutes will register themselves with a unique login name and password; the unique id will be issued to the institutes by the website. After login:
They will enter exam details like number of questions, positive and negative marks.
Then they will enter the questions along with the answers which can later be deleted and edited.
Also they will enter the list of eligible candidates with their id names which can also be edited later.
Institutes will be able to view the students list along with their respective results.
Also for students:
They should be able to login with their id, name and institute Id.
They should be able to give the exam as per the details entered by respective institutes.
Also they should be able to view their score after test finishes.
If already given the test then they should just be able to view their scores.

1.4 Thesis Structure

We start with an introduction on the background and motivation of this thesis. Then we determine the goal of the study project and describe the used methodology to achieve this goal. Next the research contribution is analyzed and presented. The remainder of the thesis organized as follows.
Focusing on the from on Semantic Web, **chapter 2**, comprises of literature reviews by spreading resourceful light to present towards the future scope & aspect on the same. These activities are directly related to what the assessment needs evaluator’s perspective and it determines the capacity of the organization as it would require certain support structures to allow us to execute in examination system. It builds around the basic communications network together with the computer network and computer hardware and software, with a procedural gap analysis which is a method of assessing the differences in performance
between a grading systems or software applications to determine whether business requirements are being met and, if not, what steps should be taken to ensure they are met successfully. Gap refers to the space between "where we are" (the present state) and "where we want to be" (the target state). A gap tool analysis may also be referred to as a requests explicit analysis, needs assessment or need measurement analysis.

In chapter 3, the scope & objective of research is discussed, which emphasizes on relevant needs and problems of the people. The highlight on research conducted doesn’t suffice the personal elaboration but to solve the needs and problems of the people.

In chapter 4, the formulation of the solution on research problems carried out with the quantitative analysis & result to withstand the formula generated. Chapter 4 makes a further investigation on the key technologies related with certain workflow steps. These key issues include the semantic annotation, ontology engineering, OWL language and specification and semantic reasoning. This study offers us theoretical support and practical methodology. The Experimentations are also covered in the same.

Chapter 5 introduces and evaluates the traditional Online Examination; Semantic Web-based online examination framework: After analyzing the problems and limitations, we propose a Semantic Web-based Online Examination solution. Then, a relevant framework is designed for the solution. In addition, we illustrate a detail work flows to achieve the framework designed.

After technology study, we implement a concrete application in the Chapter 5. A recommendation tool is developed through our Semantic Web-based Online Examination framework. This tool can provide Online Examination clients the intelligent and personalized assistance, which not only meets the student's satisfaction, but also enhances the Web services' quality.

Chapter 6 briefs on the methodology adopted during the proposed model with architectures & system inculcated on the part of front end with the thorough integration on the back end. The results of various experiments and the screenshots and the performance criteria using the above algorithms and combinations thereof have been elaborately depicted in Chapter 7.
Finally, we make a conclusion & future scope with building inventive light in Chapter 7, the purpose of a conclusion is to tie together, or integrate the various issues, research, etc. This includes noting any implications resulting from discussion of the topic, as well as recommendations, forecasting future trends, and the need for further research. The conclusion chapter or section seeks to tie together, integrate and synthesize the various issues raised in the discussion sections, whilst reflecting the introductory thesis statement (s) or objectives. Meanwhile it is remarkably pointed out the scope of future work that should be considered. Chapter 8 quotes the references & citations with web links explored and contribution by the authors to conceptualize this thesis. And added appendix proves the originality of the research as specific appreciations from renowned educational institutes throughout Delhi NCR(National Capital Region) and Haryana and the proof of published research papers, originated from the investigations.