

# ELEC S212

**Network Programming and Design**

## 2018 Autumn Presentation

**Assignment 3**

Please e-submit this assignment via the OLE

### by 9 March 2019, 23:59

**Preamble**

Dear ELEC S212 Students,

You must submit your answers to this assignment by the cut-off date: **9 March 2019**.

If you need to seek permission to submit your assignment after this date, then make your request through the OLE **before the cut-off date**. Failure to obtain permission for late submission will result in OLE rejecting the mark awarded by the tutor.

There are FIVE questions in this assignment. You should submit it and the associated source codes in zipped format and upload it to the OLE e-submission system.

You can use the server 103.247.158.246 for development and testing purpose. As we anticipate some students’ code may crash the server, do backup your data!!

Steven Choy

ELEC S212 Course Coordinator

WELL DONE!!

Please feel free to contact me if you need more support.

You have shown VERY GOOD understanding on access control of web application using password, client-side script, server-side script, web application technology, web application using flat-file database, compare & contrast IPSEC and SSL security protocols , design of DMZ and define firewall rule set.

However, you are suggested to enhance:

1. Which feature of PHP makes development process of web application much straight forward?
2. How to implement for reversing display order of database records?
3. How to compare & contrast IPSEC and SSL security protocols.
4. For DMZ, exterior router is required.

### Question 1

6 mark.

1. Give three major differences between client-side and server-side scripting?

|  |  |  |
| --- | --- | --- |
|  | **Client-side Scripting** | **Server-side Scripting** |
| **Executed by** | Client (browser) focus on frontend, such as  html, JavaScript, CSS | Server, focus on backend, such as PHP, ASP, Python |
| **Script access resources (e.g. Filling a form)** | No. Only check the data validation before sending the request to server | Yes. All data will send to server and return the result to users. |
| **View the sources code** | Yes. HTML elements and images can easily be transferred and displayed in the sources code. | No. The Server-side script source codes remain completely hidden. The use of server-side scripts requires the client to send multiple requests to the web server to provide the user with new information |

6 mark.

1. Both Flash and Java Applet are the client-side technology. Study these technologies and give three major differences of them?

|  |  |  |
| --- | --- | --- |
|  | **Flash** | **Java Applet** |
| Plug-in required | Yes. It required user to install Flash Player in different browser, such as IE, Firefox, Chrome. | Yes. It required install Java Runtime Environment (JRE) in client machine. |
| Programming language | Flash is using ActionScript language, it is OOP programming language.   It is proprietary. | Java is an object-oriented programming language. It is open standard. |
| Save flash files | Flash can save file, including images with any browser. | Java applets cannot save as images. |

0 mark.

1. Both Perl and PHP are the server-side technology to add programming logics and capabilities to a web application at the backend. PHP supports a very useful feature for writing PHP-based web application that makes the development process much straightforward. We don’t see this feature in Perl. Find out what this feature is.

This feature is the debugging feature.  
Many web engineers feel that debugging is very boring and pain, it might spend many hours online trying to test and debug the script.   
But PHP can run with web server(apache) at home. Apache allow test the programs before putting the script on the internet.

4 mark.

1. Describe the key differences between a dynamic web page and a static web page.

(Hint: Read **Lab 2.4** - Internet Application Development using PHP.)

|  |  |  |
| --- | --- | --- |
|  | Static Web Page | Dynamic Web Page |
| Language | HTML Code | Server-side(asp.net/php) and client-side(html) |
| Content | Content display the same content, until someone update the web page files. | Content will be changes based on user-input. |

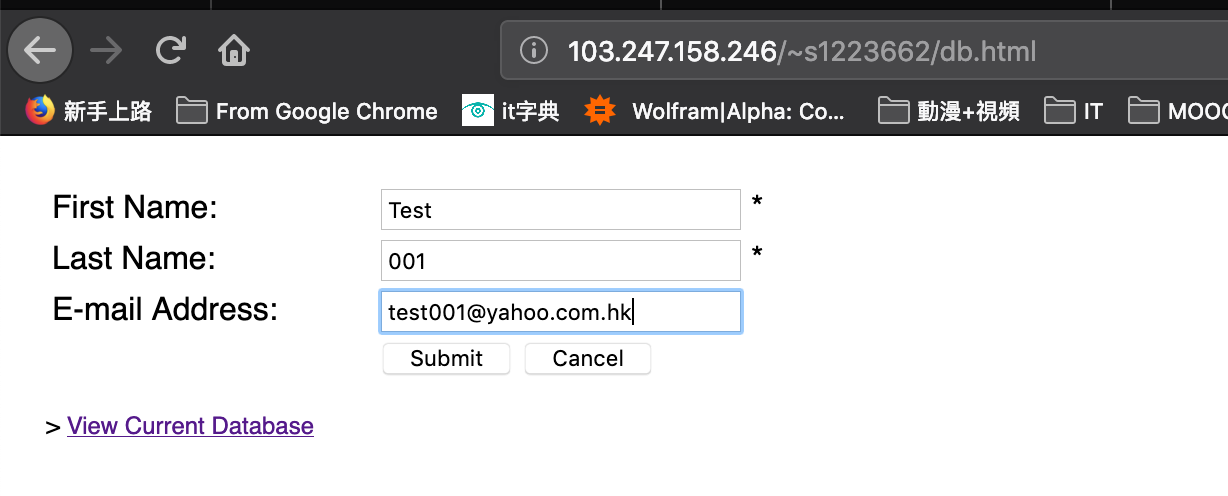
### Question 2

One of the major advantages of the World Wide Web (WWW) is its ability to reach out global audience. In order to capture information of potential clients or members around the globe, businesses or event organizers often need to implement some database applications to manage memberships or customer records. Please complete the **Lab 2.5**: Flat-file database development with CGI. In this lab, you will be guided to implement a basic web database for such purposes. The database is implemented by a plain text file. It can be accessed via the provided CGI scripts written in Perl.

What to submit?

10 mark.

1. The URL link to access the registration page (i.e. the result after Step 4)

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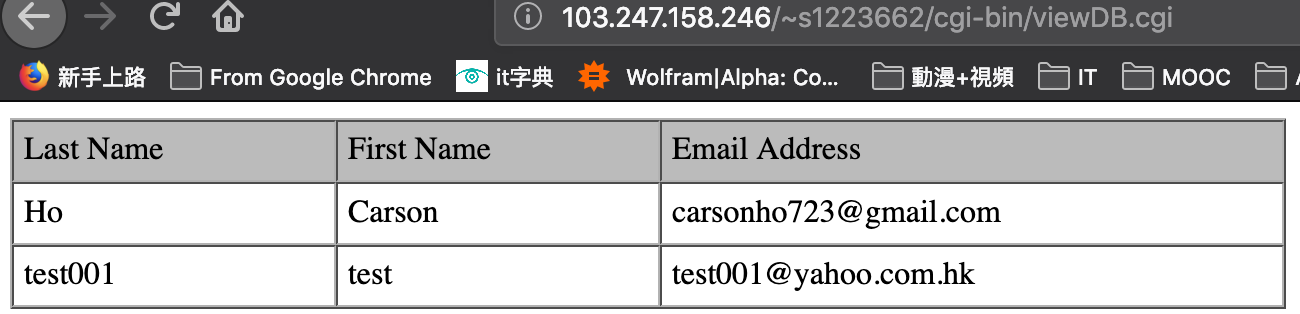
**URL:**

**<http://103.247.158.246/~s1223662/db.html>**

5 mark.

1. The URL link to view the current database record (i.e. the result after Step 5)

Students have to make sure that the above pages must be able to perform the functions they are designed for, in order to earn the corresponding marks.



URL:

<http://103.247.158.246/~s1223662/cgi-bin/viewDB.cgi>

5 mark.

1. Your answer to the Question 1 (**of the Lab 2.5**).
2. Before access the web page, set the password protection for URL. Only input the correct username and password can browse the web page.
3. Require SSL connection to a database, it will use public key encryption to secure data.

Enabling SSL encryption increases the security of data transmitted across networks between instances of Database Server and Client.

0 mark.

1. Implement a solution for Question 3 and provide the URL link to such solution.

?

### Question 3

Protecting a web site can be a laborious task since web sites face countless threats from all over the Internet around the clock. Please complete the **Lab 1.8** – Setting up password protection for your website.

12 mark.

1. The resulted URL link after completing the procedure (Step 1 – 5), together with a valid pair of user name and password.

**URL:   
[ucourse2.ouhk.edu.hk/~s1223662/protect/test.html](http://ucourse2.ouhk.edu.hk/~s1223662/protect/test.html)**

Username: s1223662

Password: 1Day3apples

8 mark.

1. Apply the learned password protection technique to the web pages you produced in **Question**

**2.** Again, provide a valid pair of user name and password to access these protected pages.

URL:

**<http://ucourse.ouhk.edu.hk/~s1223662/lab2.5_protected/db.html>**

Username: s1223662

Password: 1Day3apples

### Question 4

4 mark.

1. What are the four key goals for computer security? Provide a brief description for each of them.
2. Confidentiality. Keeping secret information, it is protected against unauthorized disclosure.
3. Integrity of data. Keeping the data is original one, protected against unauthorized modification.
4. Authentication. Validating the authenticity of something or someone. It should be verified before being granted access to systems.
5. Availability. Refer to a pc/system or component that is running for a desirably of time.

3 mark.

1. IPSec and SSL are the two popular security protocols of the Internet. Compare them in terms of where and how they operate, what they protect, and typical applications of them.

|  |  |  |
| --- | --- | --- |
|  | IPSec | SSL |
| TCP/IP Model? | Network Layer 3  Mostly used for “network-to-network” connection. | Application Layer 4 – 7  Mostly used for “client-to-network” connection. |
| Require browser to run? | IPsec need to install a dedicated IPSec client program. | SSL VPN tunnel without installing a client program, it can run with browser. |
| Requires modification of existing application? | IPSec client needs to support the NAT Penetration function to penetrate the firewall. | SSL VPN is not restricted by the internet access mode, it can penetrate the Firewall. |
| Typical Application? | Support all IP-Based application | Best for email, file sharing and browser-based apps |

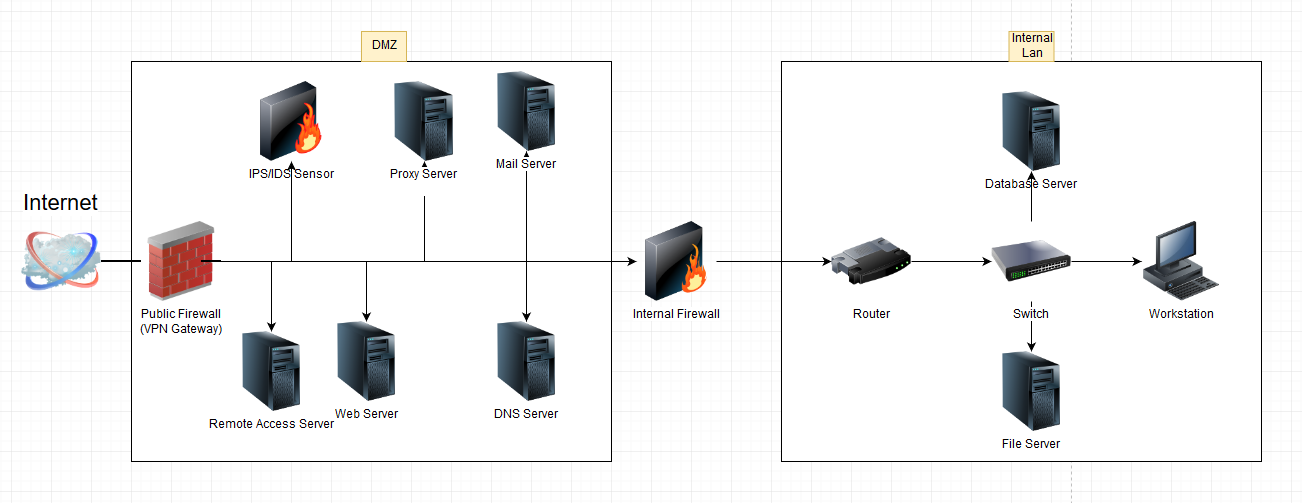
### Question 5

A company would host a web server in their corporate network, for access by external customers over the Internet. Design a secure network that could fit the following requirements:

1. An external network segment for reaching external networks/hosts over the Internet;
2. A demilitarized zone (DMZ) for hosting the web server and other security equipment;
3. Internal segments for hosting internal servers and hosts;
4. Different segments can communicate properly;
5. Proper protection for DMZ against external attacks;
6. Proper segmentation/protection for different type of network segments;

9 mark.

1. Prepare a network diagram showing the network segments required as above (1 – 3), essential routing equipment (4) , and key security equipment (5 – 6);



4 mark.

1. Describe at least two pieces of security equipment you have used in part (a).

IDS (Intrusion Detection System), is a system that monitors network traffic for suspicious activity and issues alerts when such activity is discovered.

Firewall (VPN Gateway), is a private communication network that uses a public network (such as the internet) to establish a remote connection. Encrypts data when sending and decrypts data when receiving and provides a dedicated link between two points over the internet.

6 mark.

1. Help set up the firewall rules so that all external hosts can access the web server (IP: 202.198.64.2) for its http and https services, but they CANNOT access any other service. Provide your answers to (A) – (F).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| # Firewall Rule 1:  Action: | (A) |  |  | | |
| Direction: | (B) |  |
| Source IP: | (C) |  |  | Source Port: | ANY |
| Destination IP: | (D) |  |  | Destination Port | 80, (E) |
| # Firewall Rule 2:  Action: |  |  | (F) |  |  |
| All other in or out traffics |  |  |  |  |  |

A: Allow

B: Incoming

C: any

D: 202.198.64.2

E: 443

F: Deny