



BRIEFING SESSION
ON NSS ICT
ELECTIVE –
Network

Centre for Information Technology in
Education, HKU

An Overview...

- A walk-thru' of the **basic structure of the Chapter materials + Resource Packages** for the Network Elective;
- Highlights on the possible uses of **simulation packages for Experiential Learning** (using Learning & Ass. Task #A1);
- Highlights on the possible uses of **case studies for the “Application” of knowledge** in Experiential Learning (using Learning & Ass. Task #C2);

An Overview...(Cont'd)

- Highlights on the possible uses of **live DEMO. (thru' a Unix-like environment installed on notebook PCs)** for Unix versus MS-Window permissions for file/folder sharing;
- Highlights on extensive uses of **diagrams for basic concepts in networks**, e.g. the Key/Lock diagram to explain about Middlewares for Network Applications; or message diagram for IPv4 versus IPv6 interoperability;



Elective Option B: Network

- Topic (a) on “Data Communications and Networking Basics” (38 hours)
- Topic (b) on “Network Design and Implementation” (26 hours)
- Topic (c) on “Network Management and Security” (11 hours)

(a): Data Comm. & Network Basics

A1	Basics of Data Communication and Transmission	12 periods	8 hours
A2	Network Components	4½ periods	3 hours
A3	Types of Networks	12 periods	8 hours
A4	TCP/IP Protocol Suite	31 ½ periods	11 hours
A5	Network Applications	12 periods	8 hours
Suggested Total:		57 periods	38 hours

(b): Network Design and Implementation

B1	Basics of Data Communication and Transmission	12 periods	8 hours
B2	Network Implementation (I)	18 periods	12 hours
B3	Network Implementation (II)	9 periods	6 hours
Suggested Total:		39 periods	26 hours

(c): Network Management and Security

C1	Network Management	9 periods	6 hours
C2	Network Security	7.5 periods	5 hours
Suggested Total:		16.5 periods	11 hours

Resource package

- 10 Chapters (A1 – C2)
- 4 Learning tasks
 - A1 – A3: Learning Task A #1
 - A4 – A5: Learning Task A #2
 - B1 – B2: Learning Task B #1
 - B3: Learning Task B #2
 - C1: Learning Task C #1
 - C2: Learning Task C #2

Resource package

- 4 Assessment tasks
 - A1 – A3: Assessment Task A #1
 - A4 – A5: Assessment Task A #2
 - B1 – B2: Learning Task B #1
 - B3: Learning Task B #2
 - C1: Learning Task C #1
 - C2: Learning Task C #2
- Teaching plans for each chapter

Highlight on Using Simulators

- One may use a simulator to understand Asynchronous Transfer Mode (ATM) networks
 - e.g. <http://users.rcn.com/dhudek/junidemo1.shtml>
- **A web based simulator application**

The screenshot shows a web browser window displaying the "ATM UNI 3.1 Signalling Protocol" simulator. The browser's address bar shows the URL <http://users.rcn.com/dhudek/junidemo1.shtml>. The page title is "ATM UNI 3.1 Signalling Protocol" and includes a note: "NOTE: security settings may prevent the applet from running properly, especially if you are behind a firewall".

The simulator interface features a central "ATM NETWORK" block. To its left, under "Captain Peacock", are two sections: "Point-to-Point" with buttons "Call Mrs. Stoccombe" and "Hang Up on Mrs. Stoccombe", and "Point-to-Multipoint" with buttons "Call Mr. Humphries", "Add Mr. Lucas", and "Hang Up on Mr. Lucas". A green "Peacock" icon is connected to the network. To the right, three colored boxes represent destinations: "Stoccombe" (yellow), "Humphries" (pink), and "Lucas" (cyan).

Below the network diagram are four message logs for different lines:

- Captain Peacock's Line:** 09 03 00 CA PE OF 80 00 00 MESSAGE TYPE = 0xf CONNECT ACK CRV Flag = 0 From Orig CRV = 0x00dc MessageLength = 0
- Mrs Stoccombe's Line:** (Empty)
- Mr Humphries' Line:** 09 03 00 AG DG OF 80 00 00 MESSAGE TYPE = 0xf CONNECT ACK CRV Flag = 0 From Orig CRV = 0x00dc MessageLength = 0
- Mr Lucas' Line:** (Empty)

The status bar at the bottom indicates "Applet dh.comm.atm.demo1.Demo1Juni started".

Experiential Learning

Experiential learning is the process of making meaning from direct experience.

Aristotle once said, "For the things we have to learn before we can do them, we learn by doing them."

[Adopted from: http://en.wikipedia.org/wiki/Experiential_learning]

Experiential Learning (Cont'd)

“Experiential Learning is an approach to learning in which *participants engage in an activity, reflect on the activity critically, and obtain useful insight and learnings.*”

Learning which is developed experientially is "owned" by the learner and becomes an effective and integral aspect of behavioral change....”

[Adopted from: <http://www.universityassociates.com/DELMFull.html>]



Experiential Learning (Task 1.1)

- Based on observation on interactive network simulations;
- The simulation settings can be applicable to many real-life applications;
- For instance, select the option “Call Mrs. Slocombe” under “Point-to-Point” to observe the key events occurred.

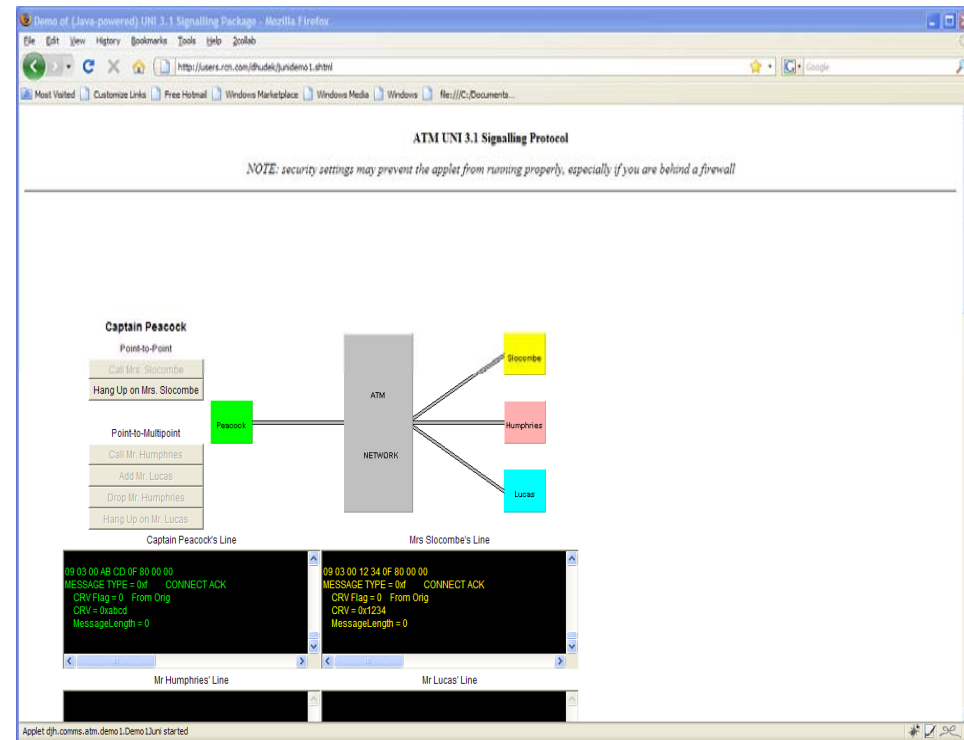
Observations for (Task 1.1)

- ➔ Objective: the node “Caption Peacock” initiates the request message (Call) that is sent through the ATM network to try to make a connection to the remote node “Mrs. Slocombe”.

- *The process of establishing the connection involves a number of control messages/packets such as*
 1. “Setup”
 2. “CALL Proceeding”
 3. “Connect”
 4. “Connect ACK”.

Simulation Result Obtained for (Task 1.1)

- At the end of the simulation, we can see the message type on both windows of “Caption Peacock’s Line” and “Mrs Slocombe’s Line” are **“CONNECT ACK” (0xf)** implying that the connection is established.

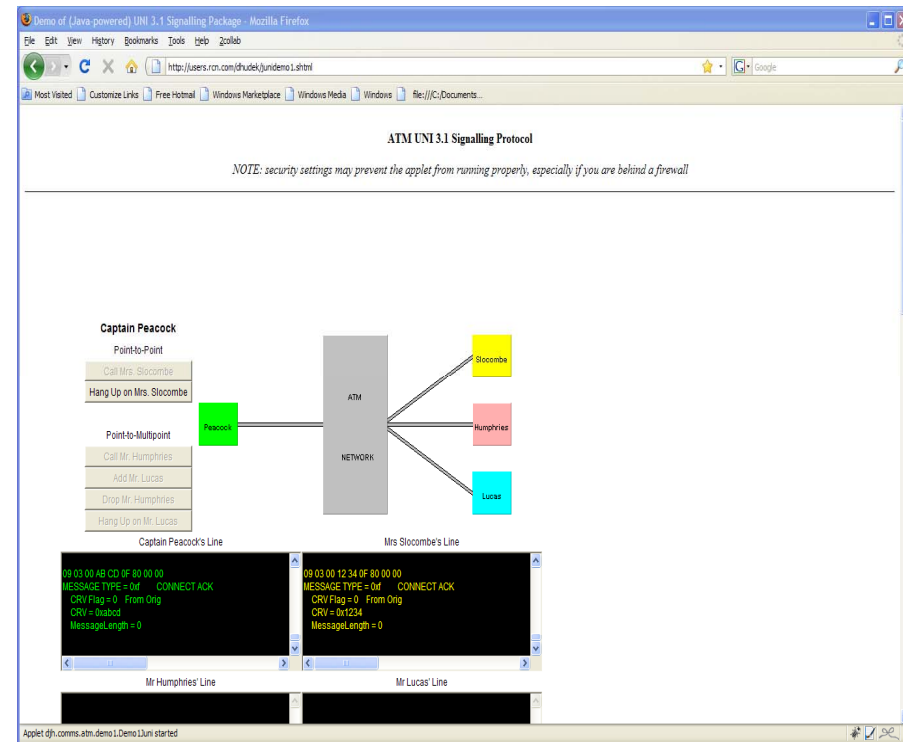


Pointers to Relevant Concepts in Chap. A1

■ Question: During the establishment of the connection, the control message is traveled at one direction at a time, how do we call this kind of communication modes ?

■ Answer: **half-duplex**

☞ (refer to Section 1.4 on Basic Communication Modes)



Assessment Task (1.1)

- Revise and renew (溫故知新) the concepts grasped in Learning Task (1.1);
- Let the exploration continues; or extending their experience to understand more and study deeper.

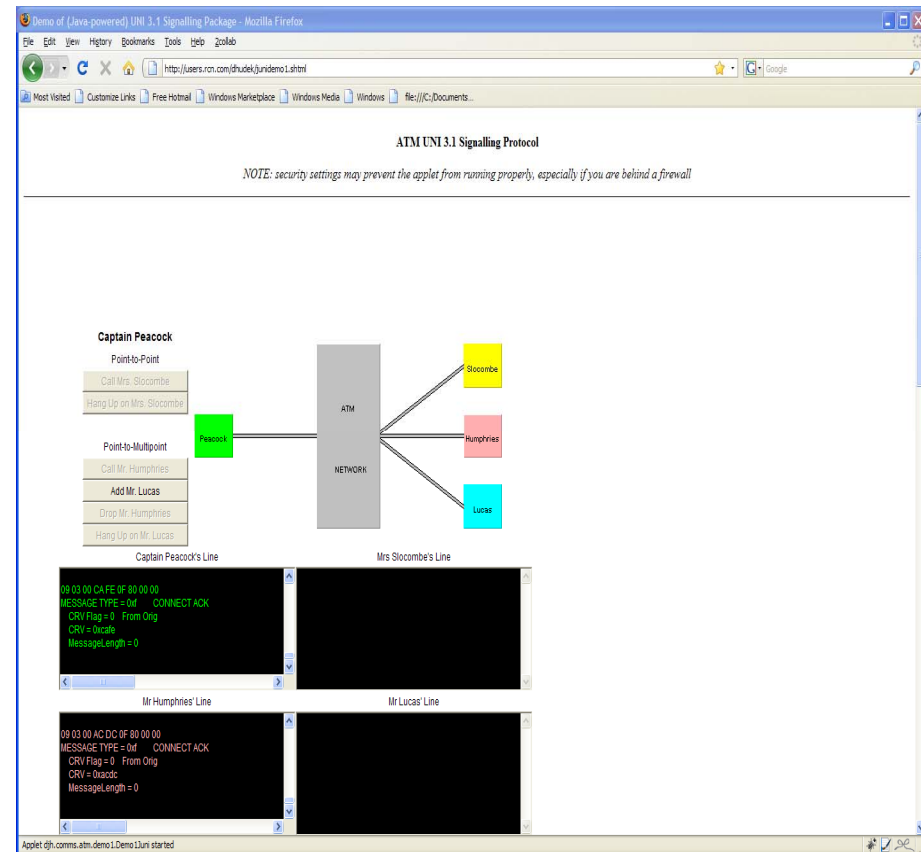
Assessment Task (1.1)

- ☞ Select each of the four operations available under “Point-to-Multiple” one after another from top to bottom.

Describe in your report, in the form of a MS Word document or PowerPoint file, about the key events generated during the simulation of each operation.

Key Events Generated in the Simulation...

1. Firstly, the node “Caption Peacock” initiates to connect to the node “Mr. Humphries” via the ATM network.



Key Events Generated in the Simulation...

2. Later, a new connection from “Caption Peacock” to “Mr. Lucas” is added. At this moment, the student can see the message type on both windows of “Mr. Humphries’s Line” and “Mr. Lucas’s Line” are **“CONNECT ACK” (0xf)**.

Demo of (para-power) UNI 3.1 Signalling Package - Mozilla Firefox

http://users.rcn.com/djrhobbs/junidemo1.htm

ATM UNI 3.1 Signalling Protocol

NOTE: security settings may prevent the applet from running properly, especially if you are behind a firewall

Captain Peacock

- Point-to-Point
 - Call Mrs. Slocombe
 - Hang Up on Mrs. Slocombe
- Point-to-Multipoint
 - Call Mr. Humphries
 - Add Mr. Lucas
 - Drop Mr. Humphries
 - Hang Up on Mr. Lucas

ATM NETWORK

Mrs Slocombe

Mr Humphries

Mr Lucas

Captain Peacock's Line

```
InitFlag = 0  Init Not Significant
ActionInd = 0  Clear the Call
ContentLength = 3
Ref Type = 0  Locally Defined Integer
Ref Flag = 1  To Orig Side
Ref Value = 1
```

Mrs Slocombe's Line

Mr Humphries' Line

```
09 03 00 AC DC OF 80 00 00
MESSAGE TYPE = 0xf  CONNECT ACK
CRV Flag = 0  From Orig
CRV = 0xadc
MessageLength = 0
```

Mr Lucas' Line

```
09 03 00 09 99 OF 80 00 00
MESSAGE TYPE = 0xf  CONNECT ACK
CRV Flag = 0  From Orig
CRV = 0x99
MessageLength = 0
```

splet.djh.comms.atm.demo.LDemo1.Juni started

Key Events Generated in the Simulation...

3. Afterward, the connection to “Mr. Humphries” is dropped. Upon successful disconnection, the student can see the message type as **“RELEASE COMPLETE”** (0x5a) appeared on the window of “Mr. Humphries’s Line”.

The screenshot shows a Java applet window titled "Demo of (Java-powered) UNI 3.1 Signalling Package - Mozilla Firefox". The applet displays a network diagram and four message logs for different lines.

Network Diagram: A central "ATM NETWORK" is connected to four lines: "Captain Peacock" (green), "Mrs Stoccombe" (yellow), "Mr Humphries" (pink), and "Mr Lucas" (cyan). The "Captain Peacock" line is connected to a "Point-to-Point" interface, while the other three lines are connected to a "Point-to-Multipoint" interface.

Message Logs:

- Captain Peacock's Line:**
 - InstFlag = 0 Inst Not Significant
 - AdmIntvl = 0 Clear the Call
 - ContentL.length = 3
 - Ref Type = 0 Locally Defined Integer
 - Ref Flag = 1 To Orig Side
 - Ref Value = 0
- Mrs Stoccombe's Line:** (Empty log)
- Mr Humphries' Line:**
 - 09 03 00 AC DC 64 00 00 00
 - MESSAGE TYPE = 0x5a RELEASE COMPLETE
 - CRV Flag = 1 To Orig
 - CRV = 0xadc
 - MessageLength = 0
- Mr Lucas' Line:**
 - 09 03 00 00 99 0F 00 00 00
 - MESSAGE TYPE = 0x01 CONNECT ACK
 - CRV Flag = 0 From Orig
 - CRV = 0x09
 - MessageLength = 0

The status bar at the bottom indicates "Applet d:\comms.atm.demo1.Demo1\uni started".

Key Events Generated in the Simulation...

4. Lastly, the connection to “Mr. Lucas” is dropped. Ultimately, the student can see the whole simulation window exactly as at the beginning except with the message type as **“RELEASE COMPLETE”** (0x5a) appeared on both windows of “Mr. Humphries’s Line” and “Mr. Lucas’s Line”.

The screenshot shows a web browser window displaying an ATM UNI 3.1 Signalling Protocol simulation. The browser address bar shows <http://users.rn.com/chude/jundemo1.shtml>. The page title is "ATM UNI 3.1 Signalling Protocol" and includes a note: "NOTE: security settings may prevent the applet from running properly, especially if you are behind a firewall".

The simulation interface features a central network diagram with an "ATM NETWORK" block. To the left, a "Captain Peacock" block is connected to the network. To the right, three other blocks are connected: "Stocombe" (yellow), "Humphries" (pink), and "Lucas" (cyan). A green box labeled "Peacock" is also connected to the network.

Below the diagram are four terminal windows showing log messages:

- Captain Peacock's Line:**

```
09 03 80 CAFE 5A 80 00 00
MESSAGE TYPE = 0x5a  RELEASE COMPLETE
CRV Flag = 1  To Orig
CRV = 0xcale
MessageLength = 0
```
- Mrs Stocombe's Line:** (Empty)
- Mr Humphries' Line:**

```
09 03 80 AC DC 5A 80 00 00
MESSAGE TYPE = 0x5a  RELEASE COMPLETE
CRV Flag = 1  To Orig
CRV = 0xadc0
MessageLength = 0
```
- Mr Lucas' Line:**

```
09 03 80 00 99 5A 80 00 00
MESSAGE TYPE = 0x5a  RELEASE COMPLETE
CRV Flag = 1  To Orig
CRV = 0x09
MessageLength = 0
```

The status bar at the bottom indicates "Applet dh.comms.atm.demo1.Demo1.Luni started".

Learning Task C#2 for **Network Security**

- **Objective of the learning task:**

Propose effective measures to improve network security for both wired and wireless networks.

- **Background:**

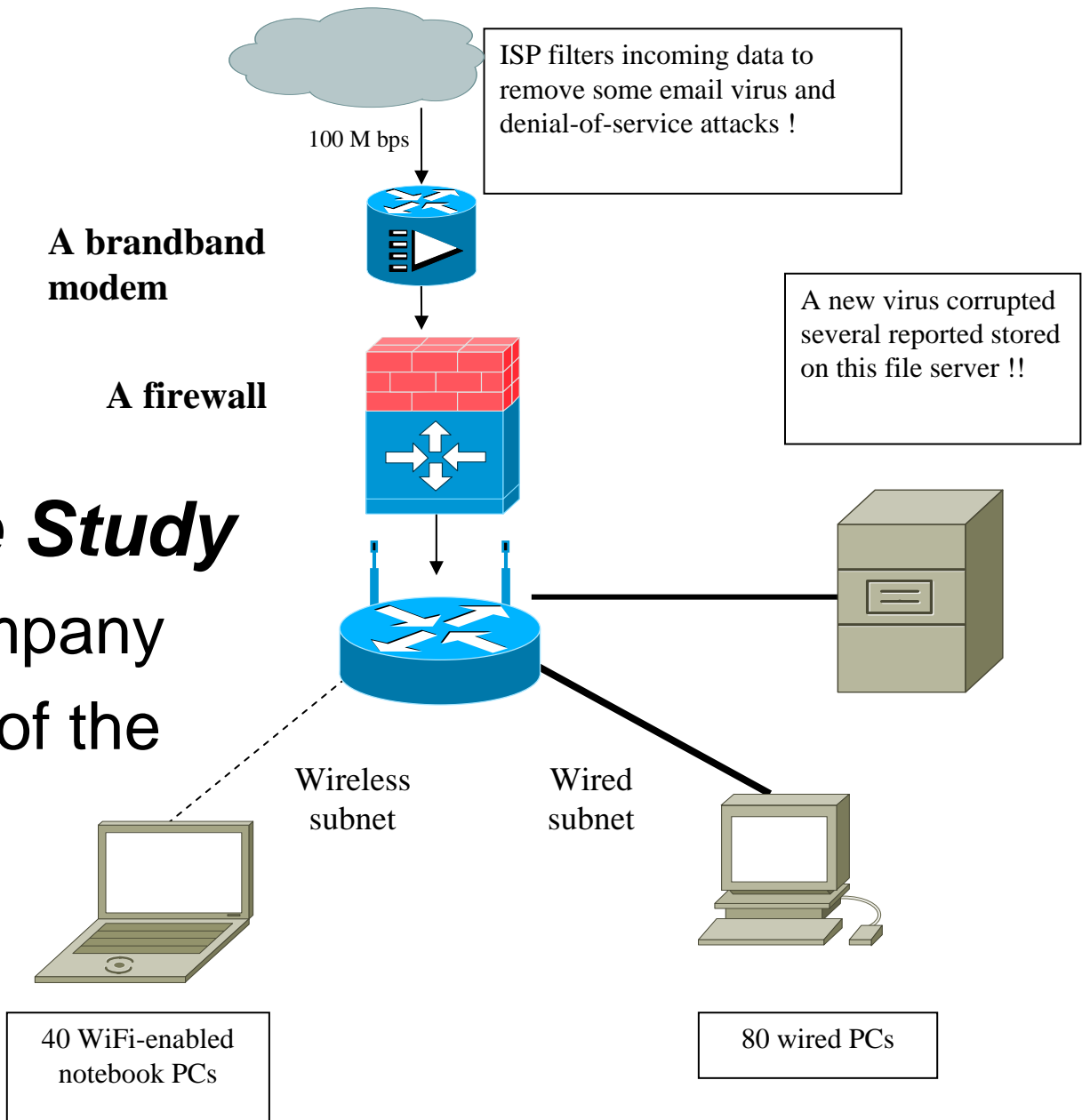
This learning task is a case study in which you act as an **external network consultant** to investigate on the possible security loophole(s) in a company network consisted of wired and wireless subnets, consider alternative measures to improve network security for both subnets, and lastly recommend required solution(s) to the company with clear explanation(s).

Learning Task C#2 for **Network Security (Cont'd)**

- As a role-playing game (RPG) for a real-world network consultant or security manager !
- 1. Identifying the Existing Problems;
- 2. **P**roposing the Alternative Solutions;
- 3. **E**valuating each Alternative Solution w.r.t. the existing environment & resources;
- 4. Make **R**ecommendations with clear **justifications !!** → **I P E R**

A Case Study

- the company network of the Speedy Crawler



A broadband modem

A firewall

100 M bps

ISP filters incoming data to remove some email virus and denial-of-service attacks !

A new virus corrupted several reported stored on this file server !!

Wireless subnet

Wired subnet

40 WiFi-enabled notebook PCs

80 wired PCs

Problem Identified...

<i>Current Practice/Situation</i>	Implied Security Problems/Hazards
<i>WiFi-enabled notebook PCs can readily connect to the wireless subnet without any password.</i>	Any intruder can easily enter into the company network !
<i>No anti-virus software is installed on all notebook or desktop PCs.</i>	Once a virus enters into the company network through the ISP or any PC connected to its intranet, the virus can be propagated very quickly.

Problem Identified...(Cont'd)

<i>Current Practice/Situation</i>	Implied Security Problems/Hazards
No backup was done for the data/reports stored on the file server.	In case some files/reports are corrupted by a virus or other attack, the relevant data will be lost permanently without any backup.
No encryption was done for the data/reports stored on the file server.	No file server or network is 100% free from malicious attack. In such cases, the original data can be readily exposed to the outside world without any encryption.

Proposed Solutions...

- a) *install an anti-virus software with constant updates* on all the company PCs;
- b) on top of the commercially available anti-virus software, *develop in-house anti-virus software with constant modification to be installed on all company PCs* for better protection;
- c) *enforce password protection for all logins* into the wired or wireless network;

Proposed Solutions...

- *encrypt all important files/reports* stored on the file server;
- *perform regular backups for all important files/reports* stored on the file server;
- *perform additional backups of all the important files/reports on some public file sharing servers* such as the Google Doc. for redundancy.

Evaluating Each Alternative...

Alternative - Necessary or Not	Detailed Explanation/Evaluation
<p><i>a) Install an anti-virus software with constant updates on all the company PCs -</i> Necessary;</p>	<p><u>Anti-virus software is important</u> for the smooth operations of modern organizations. To cut costs, and in view of the large number of potential users (> 100), <u>the company should consider to purchase a site license</u> rather than licenses for individual users.</p>

Evaluating Each Alternative...

Alternative - Necessary or Not	Detailed Explanation/Evaluation
<p><i>b) Develop in-house anti-virus software to be installed on all the company PCs for better protection –</i></p> <p><i>Not Necessary;</i></p>	<p>Due to the rapid change (or mutation) of virus software, <u>in-house development of anti-virus software is not a feasible solution to small-to-medium enterprises (SMEs) nowadays!</u></p>

Evaluating Each Alternative...

Alternative - Necessary or Not	Detailed Explanation/Evaluation
<i>c) Enforce password protection for all logins into the wired or wireless network- Necessary;</i>	The company cannot afford to expose it wireless network to any intruder without any password protection. The company may consider to use the <u>Wired Equivalent Privacy (WEP)</u> to protect <u>their wireless link</u> with users' encrypted passwords.

Evaluating Each Alternative...

Alternative - Necessary or Not	Detailed Explanation/Evaluation
<i>d) Encrypt all important files/reports stored on the file server -</i> Necessary;	Basically, other than viral or DoS attacks from the network, it is always essential to <u>have sensitive or important data encrypted before sending over the network.</u>

Evaluating Each Alternative...

Alternative - Necessary or Not	Detailed Explanation/Evaluation
<i>e) Perform regular backups for all important files/reports stored on the file server</i> – Necessary.	Besides malicious attacks from networks, it is in fact <u>necessary for all file servers to have their backups done regularly.</u>

Evaluating Each Alternative...

Alternative - Necessary or Not	Detailed Explanation/Evaluation
<i>f) Perform additional backups for all important files/reports stored on some public file server for redundancy –</i> Not Necessary;	Storing confidential or important files/reports on some public file servers will <u>easily expose the sensitive information/files for possible retrieval</u> by any public users/hackers on the Internet, even after the files are encrypted. Therefore, this alternative should not be adopted.

Recommendations...

- Final Recommendation::

In view of the clear explanations/justifications as stated above, the four suggested alternatives including a), c) d) and e) should be implemented as effective measures to enhance the network security for both wired and wireless networks of the concerned company, Speedy Crawler, in Hong Kong.

Possible Extensions of this Case Study....?!

- Numerous possible extensions of this case study to prompt for students' thinking/analysis, e.g.
 - What should be the network topology adopted for the wired subnet ? – bus, ring, star or (hierarchical) tree structure, and their possible implications to performance and/or security (e.g. a single point of failure for the star network) [ref. to Chapter A3.2.1 ~ 3.2.4];
 - What should be the network structure adopted for the wireless subnet ? – a centralized or decentralized P2P network (e.g. the centralized server node may easily be overloaded !) [ref. to Chapter A3.3.2]

About LIVE Demo. for the Unix File/Folder Permissions

(ref. Chap. B2)...

For each class of **UNIX** users, there are **3** specific permissions on the Unix-like file-system to be **set/unset** with their explicit meanings specified as below:

- The *read* (or simply denoted as **[r]**) permission: to grant the right to read a file.
- The *write* (or simply denoted as **[w]**) permission: to grant the right to modify a file.
- The *execute* (or simply denoted as **[x]**) permission: to grant the ability to execute a file.

About LIVE Demo. for the Unix File/Folder Permissions

(ref. Chap. B2)...[Cont'd]

- base permissions for directories/files are **[rwxrwxrwx]** denoting the read, write and execute permissions are all granted for the corresponding **owner, group and others** class.
- Each **[rwx]** permission as a 3-bit pattern with 1 for set and 0 for unset, and therefore may correspond to a binary pattern like “111” (binary) or “7” (octal).

About A LIVE Demo. for the Unix File/Folder Permissions

(ref. Chap. B2)...[- about the “chmod” command !]

- The Unix command “chmod” can directly modify the file/folder permissions of a file/folder. A user can specify the targeted file/folder permissions in the ‘symbolic mode’ like ‘u+rw’ or directly in ‘octal number’ like 664 as follows.

```
$ chmod ug+rwO+r file1
```

- that grants both “read” and “write” permissions to the “user” and “group” classes while granting only “read” to “others” for the single file named “file1”.

About A LIVE Demo. for the Unix File/Folder Permissions

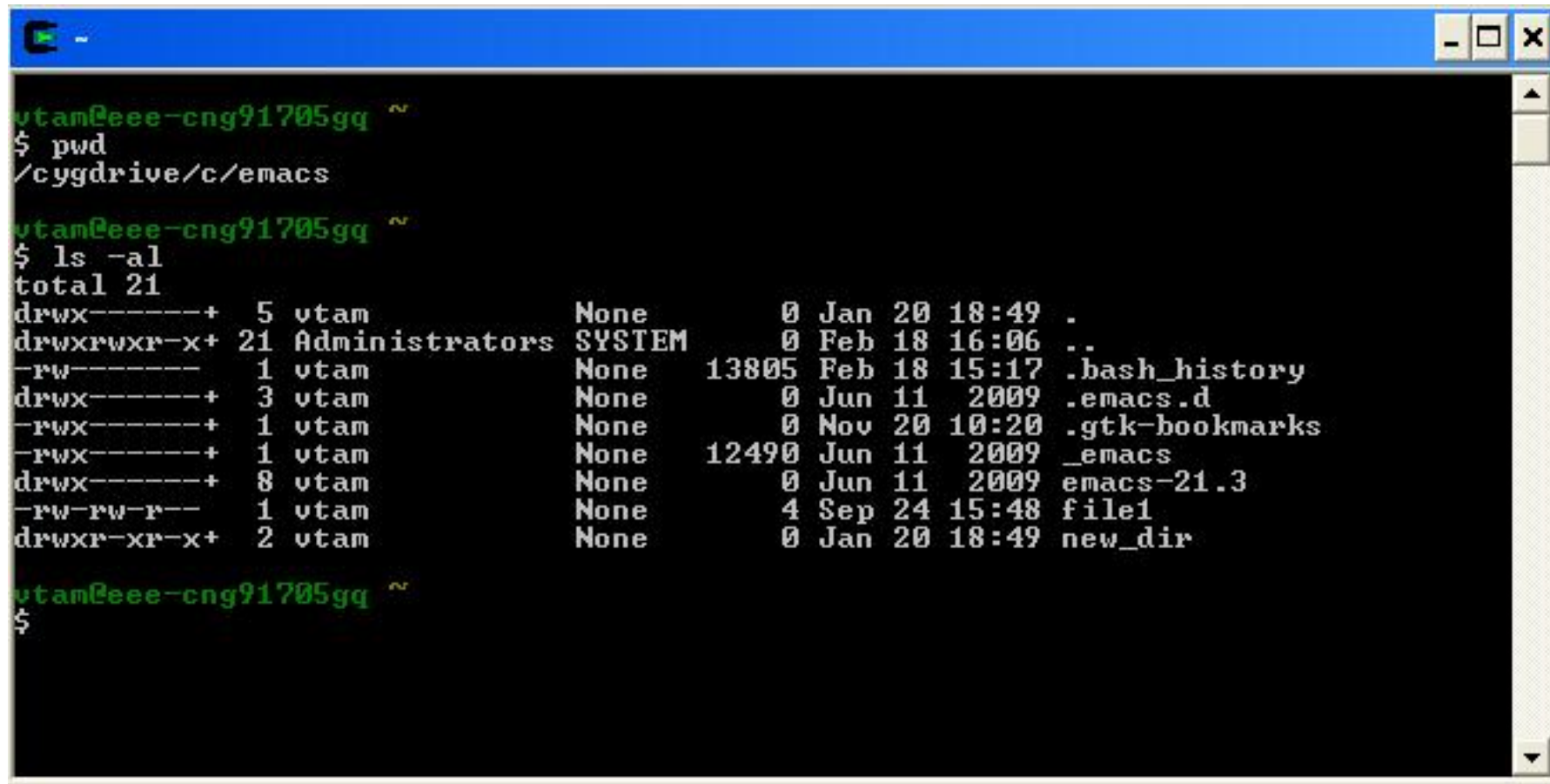
(ref. Chap. B2)...[- about the “chmod” command !]

It is always easier to visualize the resulting permission Using the following (U, G, O) template for each [r,w,x] Pattern.

	<i>User</i>			<i>Group</i>			<i>Others</i>		
	<i>r</i>	<i>w</i>	<i>x</i>	<i>r</i>	<i>w</i>	<i>x</i>	<i>r</i>	<i>w</i>	<i>x</i>
file1	√	√	—	√	√	—	√	—	—

More on the Unix File/Folder Permissions

(ref. Chap. B2)...



```
vtam@eee-cng91705gq ~  
$ pwd  
/cygdrive/c/emacs  
  
vtam@eee-cng91705gq ~  
$ ls -al  
total 21  
drwx-----+  5 vtam      None      0 Jan 20 18:49 .  
drwxrwxr-x+ 21 Administrators SYSTEM    0 Feb 18 16:06 ..  
-rw-----  1 vtam      None    13805 Feb 18 15:17 .bash_history  
drwx-----+  3 vtam      None      0 Jun 11 2009 .emacs.d  
-rwx-----+  1 vtam      None      0 Nov 20 10:20 .gtk-bookmarks  
-rwx-----+  1 vtam      None    12490 Jun 11 2009 _emacs  
drwx-----+  8 vtam      None      0 Jun 11 2009 emacs-21.3  
-rw-rw-r--  1 vtam      None      4 Sep 24 15:48 file1  
drwxr-xr-x+  2 vtam      None      0 Jan 20 18:49 new_dir  
  
vtam@eee-cng91705gq ~  
$
```

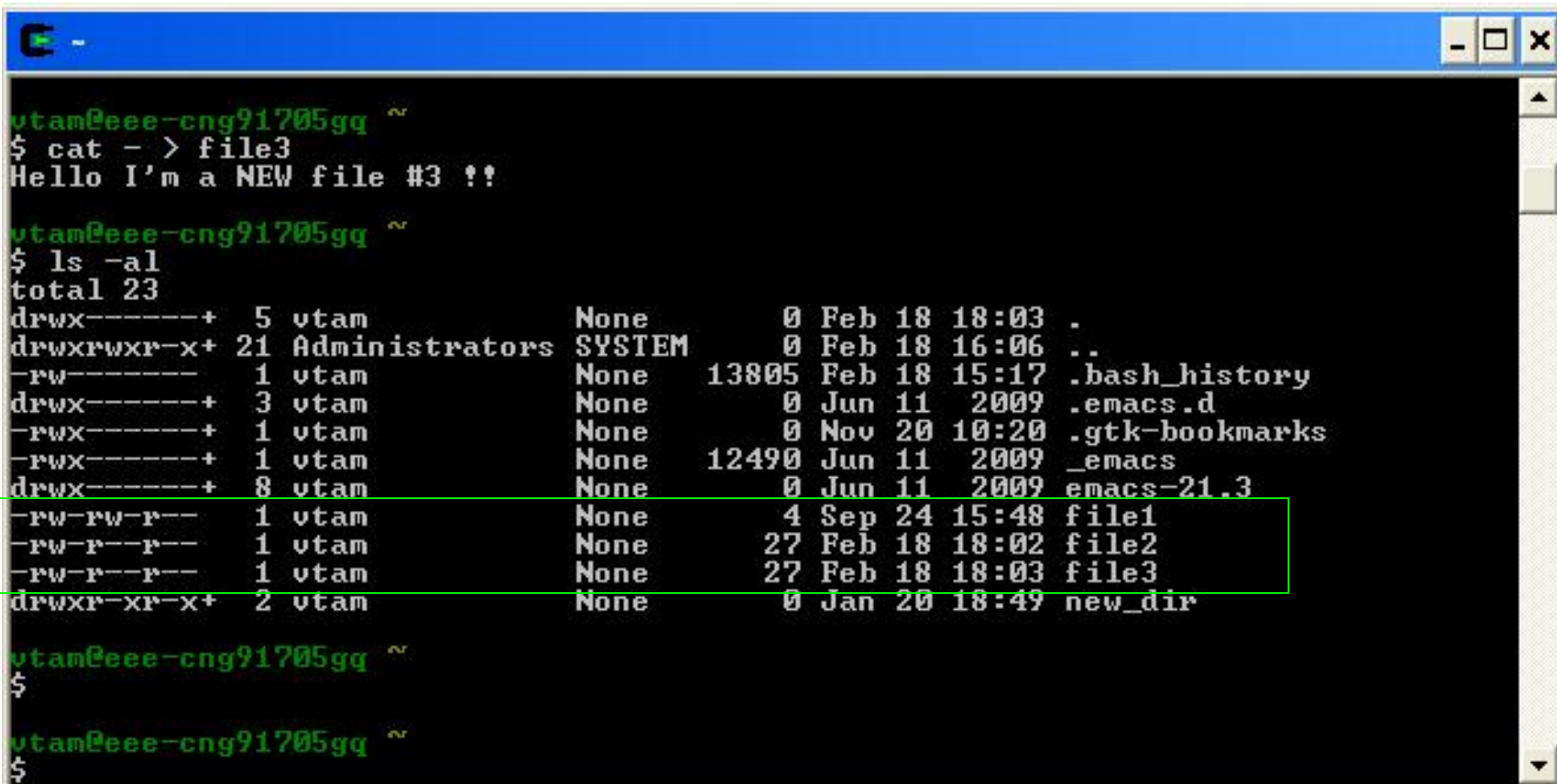
More on the Unix File/Folder Permissions

(ref. Chap. B2)...- Prepare Files

```
vtam@eee-cng91705gq ~  
$ ls -al  
total 21  
drwx-----+  5 vtam      None      0 Jan 20 18:49 .  
drwxrwxr-x+ 21 Administrators SYSTEM    0 Feb 18 16:06 ..  
-rw-----  1 vtam      None    13805 Feb 18 15:17 .bash_history  
drwx-----+  3 vtam      None      0 Jun 11 2009 .emacs.d  
-rwx-----+  1 vtam      None      0 Nov 20 10:20 .gtk-bookmarks  
-rwx-----+  1 vtam      None    12490 Jun 11 2009 _emacs  
drwx-----+  8 vtam      None      0 Jun 11 2009 emacs-21.3  
-rw-rw-r--  1 vtam      None      4 Sep 24 15:48 file1  
drwxr-xr-x+  2 vtam      None      0 Jan 20 18:49 new_dir  
  
vtam@eee-cng91705gq ~  
$ cat - > file2  
Hello I'm a NEW file #2 !!  
  
vtam@eee-cng91705gq ~  
$ cat - > file3  
Hello I'm a NEW file #3 !!  
  
vtam@eee-cng91705gq ~  
$
```

More on the Unix File/Folder Permissions

(ref. Chap. B2)...- Show File Permissions



```
vtam@eee-cng91705gq ~
$ cat -> file3
Hello I'm a NEW file #3 !!

vtam@eee-cng91705gq ~
$ ls -al
total 23
drwx-----+  5 vtam      None      0 Feb 18 18:03 .
drwxrwxr-x+ 21 Administrators SYSTEM    0 Feb 18 16:06 ..
-rw-----   1 vtam      None    13805 Feb 18 15:17 .bash_history
drwx-----+  3 vtam      None      0 Jun 11  2009 .emacs.d
-rwx-----+  1 vtam      None      0 Nov 20 10:20 .gtk-bookmarks
-rwx-----+  1 vtam      None    12490 Jun 11  2009 _emacs
drwx-----+  8 vtam      None      0 Jun 11  2009 emacs-21.3
-rw-rw-r--   1 vtam      None      4 Sep 24 15:48 file1
-rw-r--r--   1 vtam      None     27 Feb 18 18:02 file2
-rw-r--r--   1 vtam      None     27 Feb 18 18:03 file3
drwxr-xr-x+  2 vtam      None      0 Jan 20 18:49 new_dir

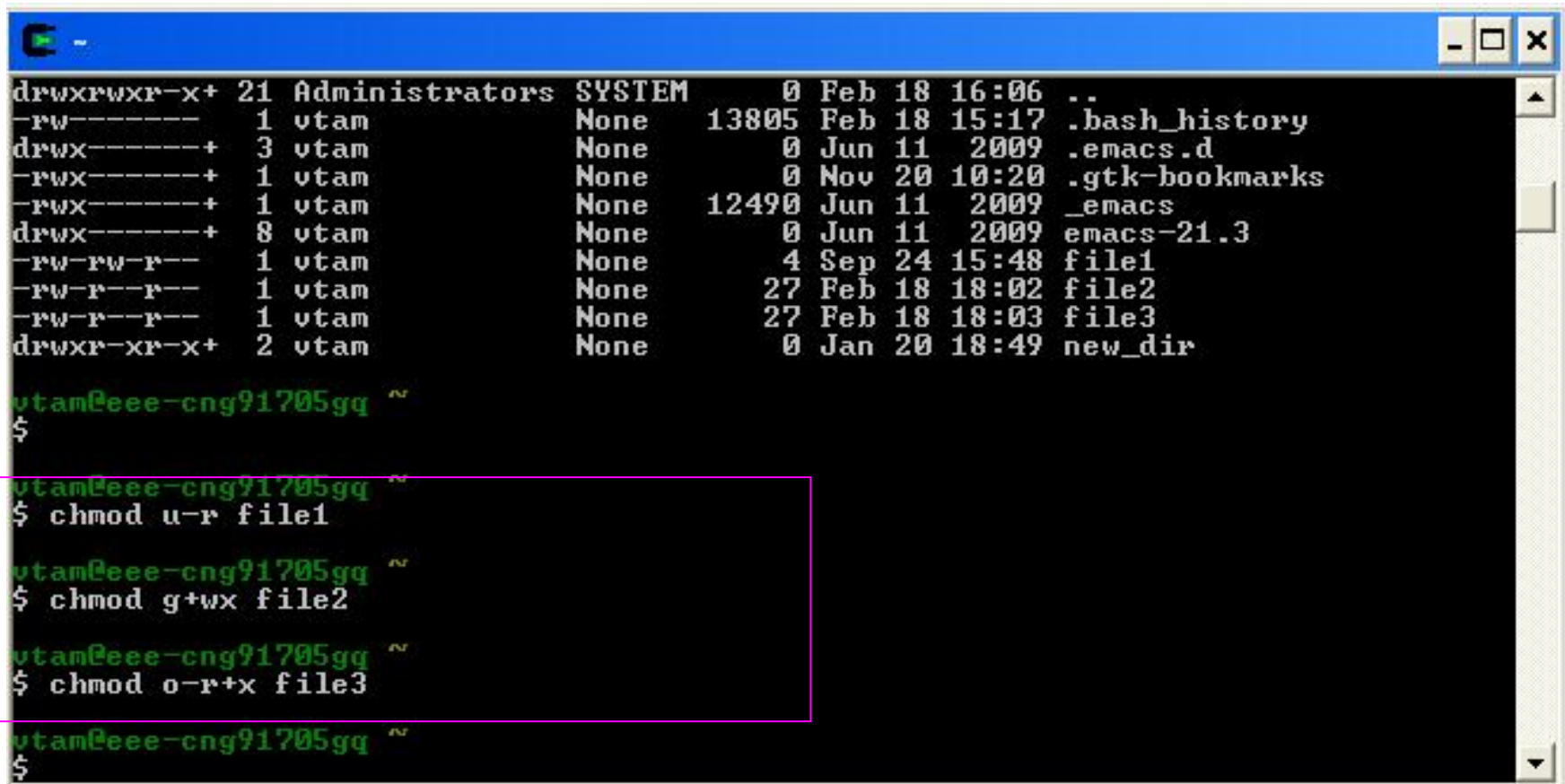
vtam@eee-cng91705gq ~
$

vtam@eee-cng91705gq ~
$
```

The terminal window displays the output of the `ls -al` command. A green box highlights the permissions for `file1`, `file2`, and `file3`, which are `-rw-rw-r--`, `-rw-r--r--`, and `-rw-r--r--` respectively.

More on the Unix File/Folder Permissions

(ref. Chap. B2)...- Change File Permissions



A terminal window showing the output of the `ls -l` command and subsequent `chmod` commands. The window title is `-`. The output of `ls -l` is as follows:

```
drwxrwxr-x+ 21 Administrators SYSTEM 0 Feb 18 16:06 ..
-rw----- 1 vtam None 13805 Feb 18 15:17 .bash_history
drwx-----+ 3 vtam None 0 Jun 11 2009 .emacs.d
-rwx-----+ 1 vtam None 0 Nov 20 10:20 .gtk-bookmarks
-rwx-----+ 1 vtam None 12490 Jun 11 2009 _emacs
drwx-----+ 8 vtam None 0 Jun 11 2009 emacs-21.3
-rw-rw-r-- 1 vtam None 4 Sep 24 15:48 file1
-rw-r--r-- 1 vtam None 27 Feb 18 18:02 file2
-rw-r--r-- 1 vtam None 27 Feb 18 18:03 file3
drwxr-xr-x+ 2 vtam None 0 Jan 20 18:49 new_dir
```

The user `vtam` at host `eee-cng91705gq` then runs the following `chmod` commands:

```
vtam@eee-cng91705gq ~
$
vtam@eee-cng91705gq ~
$ chmod u-r file1
vtam@eee-cng91705gq ~
$ chmod g+wx file2
vtam@eee-cng91705gq ~
$ chmod o-r+x file3
vtam@eee-cng91705gq ~
$
```

The `chmod` commands and their output are highlighted with a red box in the original image.

More for the Unix File/Folder Permissions

(ref. Chap. B2)...- Final Results !!

```
$ chmod u-r file1
vtam@eee-cng91705gg ~
$ chmod g+wx file2
vtam@eee-cng91705gg ~
$ chmod o-r+x file3
vtam@eee-cng91705gg ~
$ ls -al
total 23
drwx-----+  5 utam      None      0 Feb 18 18:03 .
drwxrwxr-x+ 21 Administrators SYSTEM    0 Feb 18 16:06 ..
-rw-----   1 utam      None    13805 Feb 18 15:17 .bash_history
drwx-----+  3 utam      None      0 Jun 11  2009 .emacs.d
-rwx-----+  1 utam      None      0 Nov 20 10:20 .gtk-bookmarks
-rwx-----+  1 utam      None    12490 Jun 11  2009 _emacs
drwx-----+  8 utam      None      0 Jun 11  2009 emacs-21.3
--w-rw-r--   1 utam      None      4 Sep 24 15:48 file1
-rw-rwxr--   1 utam      None      27 Feb 18 18:02 file2
-rw-r-----x 1 utam      None      27 Feb 18 18:03 file3
drwxr-xr-x+  2 utam      None      0 Jan 20 18:49 new_dir
vtam@eee-cng91705gg ~
$
```

More on the Cygwin for the Unix File/Folder Permissions

(ref. Chap. B2)...- Reason about Results !!

file1 :	rw-rw-r--
	-) r
\$chmod u-r file1	= -w-rw-r--
file2 :	rw-r--r--
	+) wX
\$chmod g+wx file2	= -rw-rwxr--

- : means NOT SET

More for the Unix File/Folder Permissions

(ref. Chap. B2)...- Reason about Results !!

file3 :	rw-r--r--
	-) r
\$chmod o-r+x file1	+) x

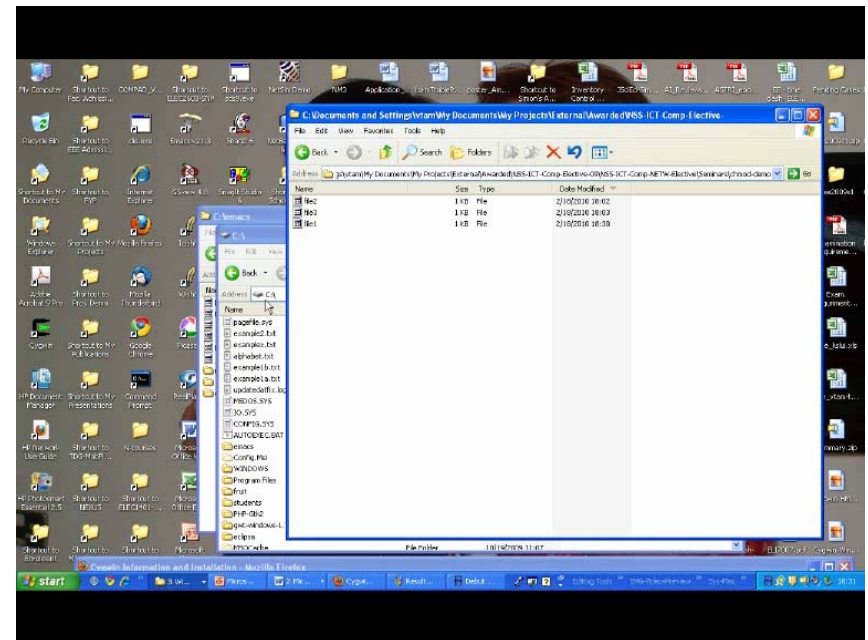
	= rw- r-- --x

- : means NOT SET

More for the Unix File/Folder Permissions

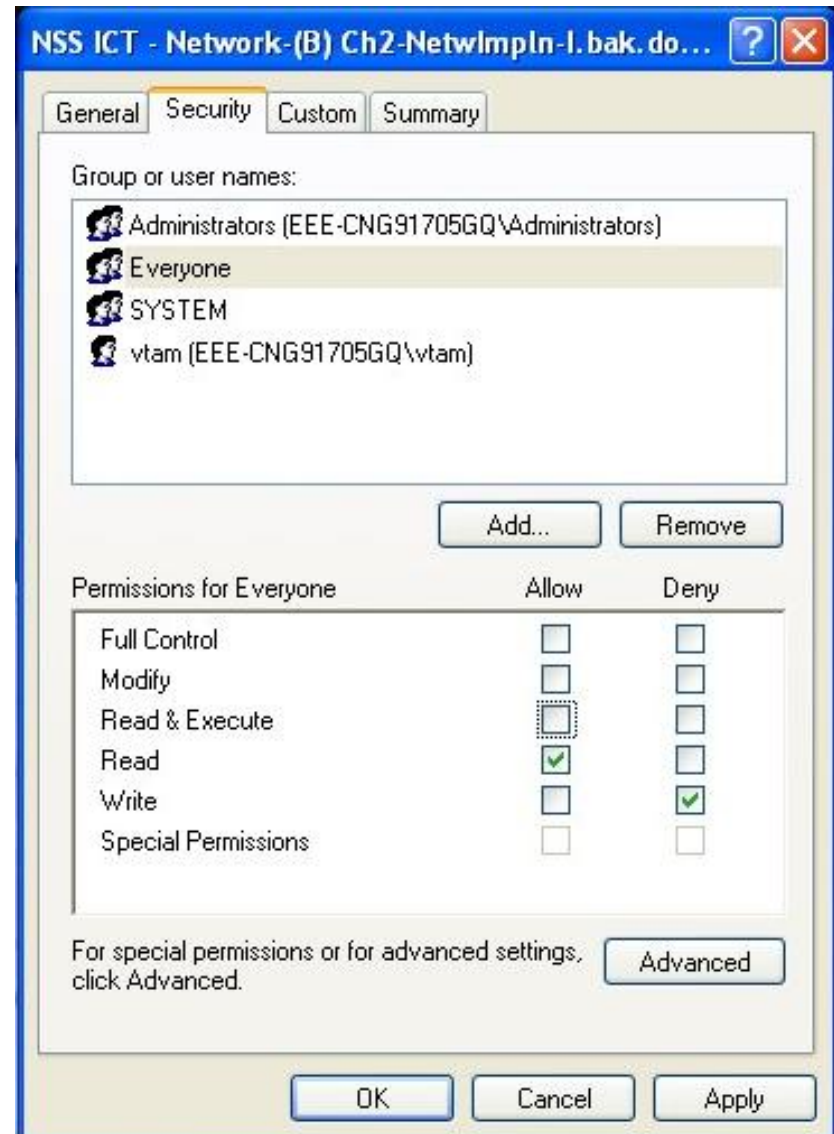
(ref. Chap. B2)...

- **OR simply use some FREE video capture software such as the DEBUT Video Capture Software [URL : <http://www.nchsoftware.com/capture/>] to create a step-by-step DEMO video as THIS →**



File Permissions on MS Windows

- On MS Windows, one can easily set the Access Control List (ACL) of the concerned file to individual user(s) by clicking on the “Properties” of that file. [ref. Sec. 3.3 of Chp. B2]



Highlights on Uses of Diagrams for

~~Lock/Key Diagram for RCP-based Middlewares

- For remote procedure call (RPCs), the close relationship % the main program (server) and the remote procedure (client) as 'lock-and-key' where the main program is similar to a lock (in shape) that has to be released by the remote procedure as a key.

[ref. Chp. A5.2]

Highlights on Uses of Diagrams for ~~Lock/Key Diagram for RCP-based Middlewares

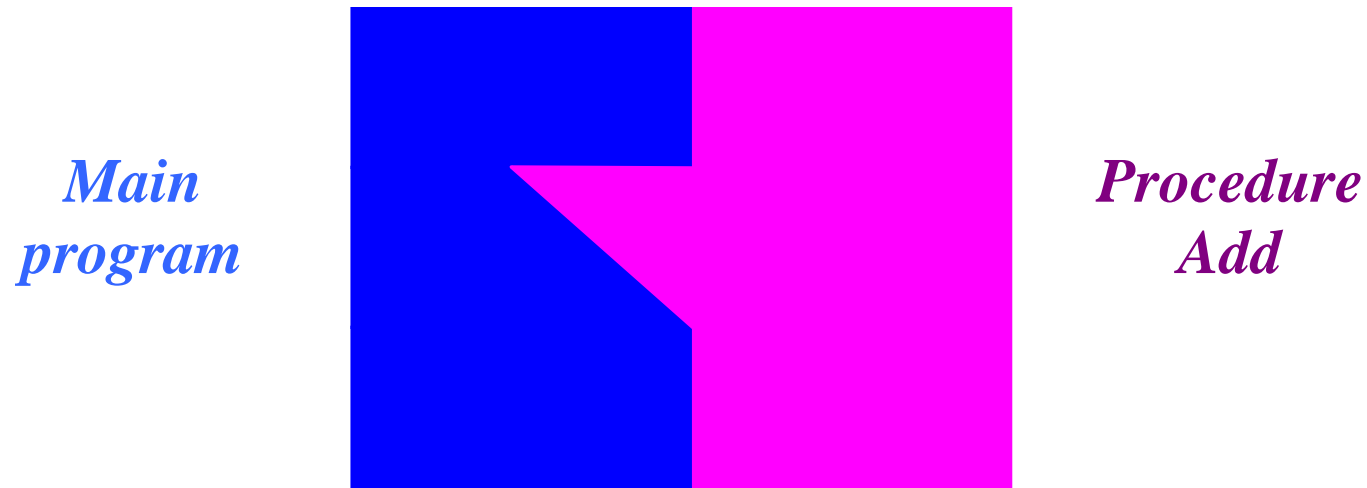


Fig 1. The Close Relationship between the Remote Procedure and Client Program in a RPC system

[ref. Chp. A5.2]

Highlights on Uses of Diagrams for ~~Extending the Concepts for RCP- based Middlewares

*Main
Program
(Bank
Trans.
Server)*



*Procedure
ATM_Rq
(Client)*

Fig 2. Real-world Application of the RPC-based system for Bank Transaction Server and the ATM (Client) machines

[ref. Chp. A5.2]

Highlights on Uses of Diagrams for ~~ IPv4 versus IPv6 [Interoperability]

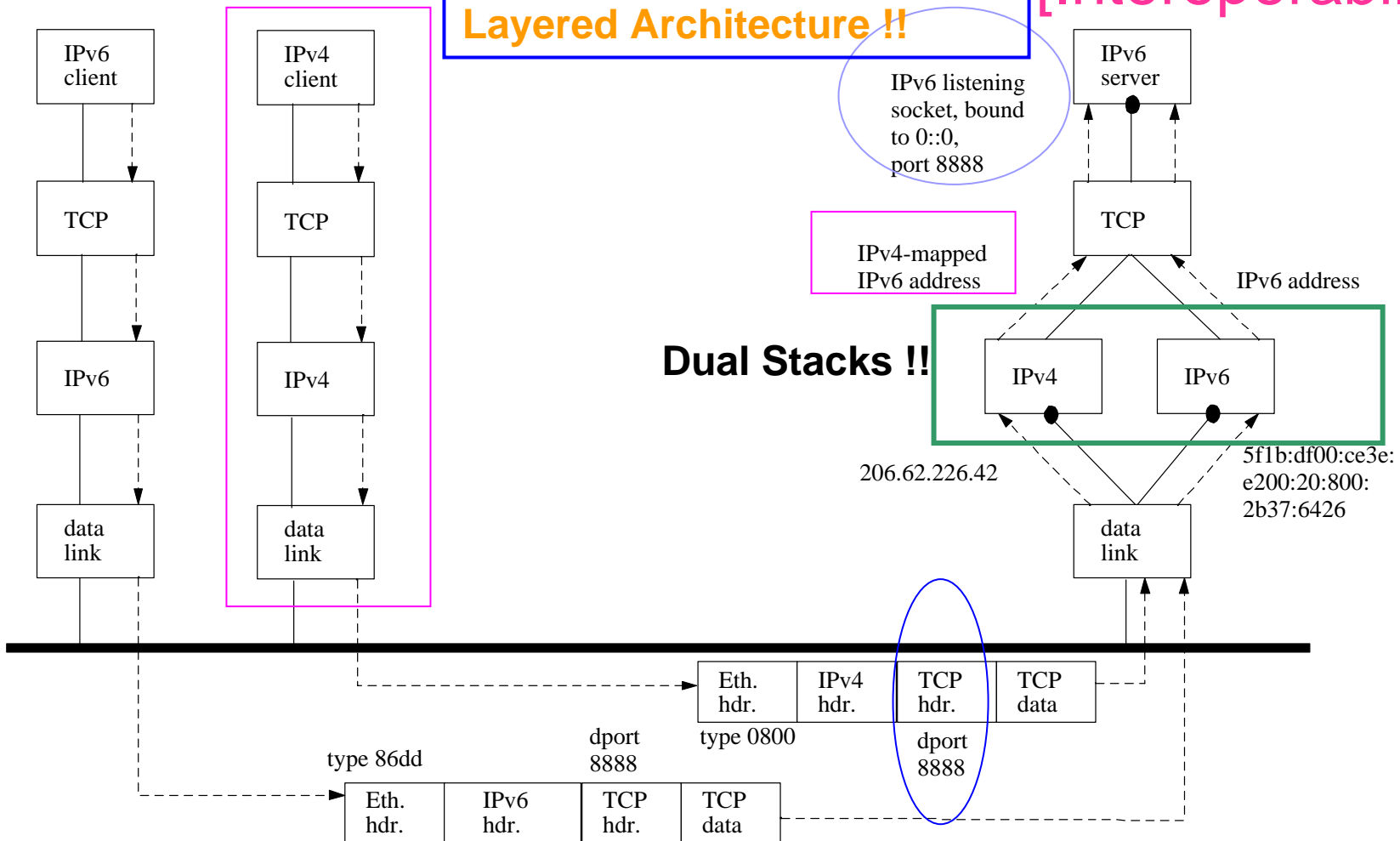
- Gradually move to IPv6; but definitely not completely replacing IPv4
- IPv4 and IPv6 **coexist**
- Four different application scenarios:
 - IPv4 server, IPv4 client
 - IPv4 server, IPv6 client
 - **IPv6 server, IPv4 client**
 - IPv6 server, IPv6 client
- Hosts (servers and clients) and routers will need to run dual stacks.

Highlights on Uses of Diagrams for

~~ IPv6 server vs. IPv4 client

Advantage of Layered Architecture !!

[Interoperability]





End

THANK you !!

Q & A