Homework (3)

Deadline: 1404 / 03 / 02

English for Computing

Spring 1404

Tips

1. Using GPT is not allowed for answering the questions.
2. With each day of delay in submitting the answer sheet, you will lose 25% of your homework score.
3. Name your answer sheet using the format “ESP-SID-Name”.
4. Please upload your answer sheet in the appropriate section of the course page in CW.
5. Make sure you have written your name and student ID in your answer sheet.

Question 1

The Transatlantic Cable

Laying the transatlantic cable was the culmination of the unflagging perseverance of one man leading like-minded men, of disparate technical and scientific advances, and of the need for faster communication. The first attempts at laying the cable in the 1850s, each of which cost an enormous amount of money, failed utterly. Yet as technology and science improved, and the need for faster communication increased, perseverance finally paid off.

The man who rallied support and raised money for the transatlantic cable venture was Cyrus Field, a New York businessman, who started the New York, Newfoundland, and London Telegraph Company in 1854. For the next twelve years, Field raised money and expectations in North America and England for repeated attempts at laying a cable, despite catastrophic cable breaks and a formal inquiry when the first cable stopped working within days.

The scientific and technological advances began with electricity, the study of which was attracting the greatest minds of the age. Samuel Morse invented a code that made it possible to send information over electric wires, and he made the first successful transmission in 1842. The next year, d'Almeida, a Portuguese engineer, announced the use of gutta-percha, a rubberlike sap from the gutta tree, as an insulation for wires. Thus, two of the requisites for an underwater cable were met. In the next several years, telegraph cables were laid in Atlantic Canada, across the English Channel and around Europe, and across the United States.

In 1857, the company Field founded set out to lay the cable that had taken months and almost a million dollars to make. The cable was made of 340,000 miles of copper and iron wire and three tons of gutta-percha insulation, too much for one ship to carry. The cable was divided between two ships, each towed by another, all four provided by the

British and American navies. After only 255 miles of cable had been laid, the cable stopped transmitting and then snapped, sinking to the depths of the ocean. The second attempt was made in 1858, beginning at the midpoint of the Atlantic, from which each ship lay cable as she sailed to her home shores. Again, the cable inexplicably stopped working. They tried again a month later, beginning again from the middle and sailing in opposite directions. This time, successful! Queen Victoria sent a message to President Buchanan, and both countries celebrated. Within hours, however, the signal began failing. To compensate for the fading transmissions, Whitehouse, the American engineer, transmitted messages at higher voltages, eventually burning out the cable. Once a hero, Field was now vilified.

Work on the transatlantic cable was halted because of the American Civil War. During the war, the telegraph became indispensable, and enthusiasm for a transatlantic cable mounted. In Scotland, William Thomson, who would later be knighted by Lord Kelvin for his work, corrected the design flaws in Whitehouse’s cable. Kelvin also designed a mirror-galvanometer that could detect weak currents, thus allowing lower voltages and weaker currents to transmit information. In 1866, the world’s largest steamship laid Kelvin’s new cable, an unqualified success. Field’s perseverance had triumphed in the end.

Answer the questions about *The Transatlantic Cable*.

Questions 1–4

Look at the following inventors and the list of descriptions below. Match each inventor with the correct description, A–F.

A. burned out the first transatlantic cable by using high voltages
B. was the first to be utterly successful in getting the transatlantic cable laid
C. invented a type of insulation from the sap of a tree

D. sent a telegraph message to President Buchanan

E. was the first to attempt to have a transatlantic cable laid

F. developed a code for transmitting messages by electric cable

1. Morse
2. d'Almeida
3. Field
4. Kelvin

Questions 5 – 9

Complete the summary using words from the list below.

In the 1850s, several unsuccessful attempts were made to lay a telegraph cable across the Atlantic Ocean. For the first attempt, a cable was manufactured of copper and iron wire with gutta-percha **5.** _______. It was so heavy that the ships that carried it had to be **6.** _______ by other ships. This cable failed because it **7.** _______ and sank beneath the sea. The second attempt also failed. The third attempt appeared to be successful, and a message was **8.** _______ from England to the United States. However, the telegraph company did not **9.** _______ this time either. This attempt also turned out to be a failure when the cable stopped working, and the reputations of the project leaders were vilified.

Word list:

- compensated
- rallied
- towed
- triumph
- insulation
- snapped
- transmitted
- voltage

Question 2

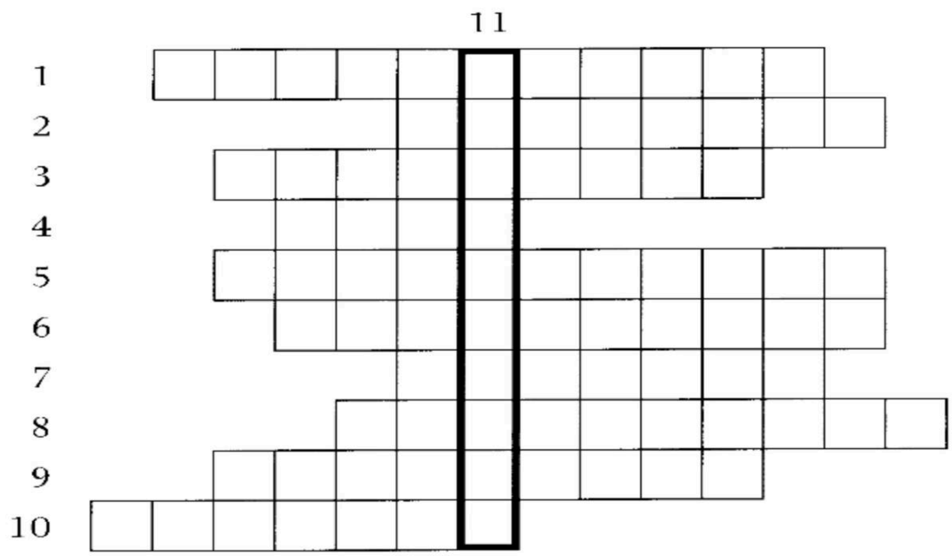
complete the following crossword puzzles according to your own knowledge. The numbers in parentheses at the end of each clue indicate the number of letters in the answer.

Across

1. A program designed to perform a specific function. (11)
2. A general term for programs which do not form part of a computer but are used when operating it. (8)
3. A facility which allows the user to read in a file of names and create 'personalized' letters. (4,5)
4. A sequence of instructions that is repeated until a desired condition is reached. (4)
5. A program that manipulates rows and columns of figures, used especially for accounting. (11)
6. The combined use on computers of text, graphics, video, animation, and sound. (10)
7. The ……. editor is a systems program that fetches required systems routines and links them to the object module. (7)
8. The business of preparing, printing, and distributing books or magazines, etc. to the public. (10)
9. Someone who creates new software products. (9)
10. A program or series of programs directed at some generic application (e.g. word processing) that can be tailored by the user to match his individual needs. (7)

Down

1. An IBM-….. computer is one which can be used with other IBM hardware. (10)



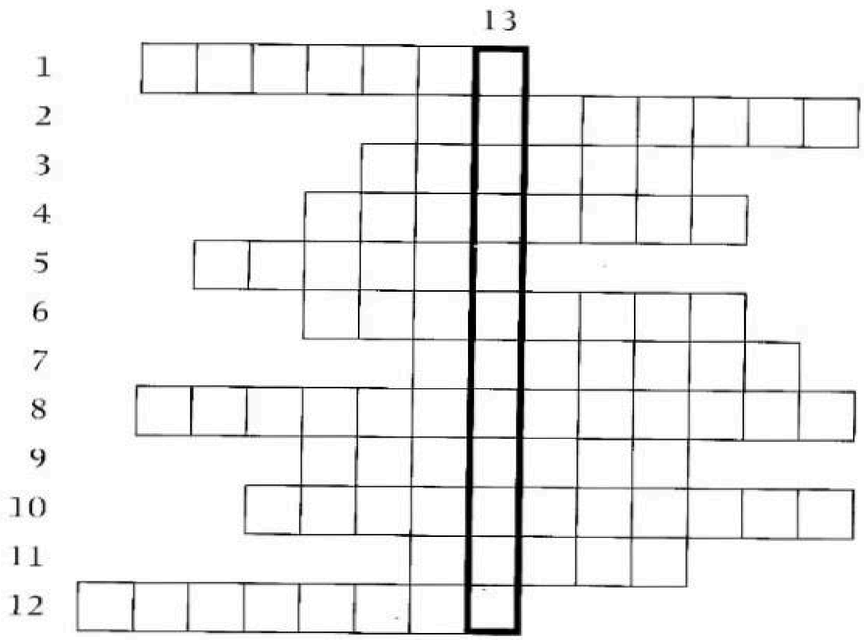
Across

1. A combination of electronic devices and conductors that form a conducting path. (7)
2. An agreement that covers the procedures used to exchange information between co-operating computers. (8)
3. This kind of transmission has been the basis for telephone technology for many years, though it is gradually being replaced. (6)
4. To send programs or data from a central computer to a remote PC. (8)
5. Single vibrations of electric current. (7)
6. A VDU screen and keyboard used to interact with a computer, usually with no computing capacity of its own. (8)

7. This kind of transmission consists of electrical signals representing data in binary code. (7)
8. A public database, for example, that can be accessed over a computer or telephone network. (6,7)
9. A ..... terminals and links them to the main computer. (7)
10. This merges information from several channels into one channel. (11)
11. A device that converts the computer's digital bit stream into an analog signal for transmission over a telephone line. (5)
12. A ..... write messages. (8)

Down

13. The process of sending signals electronically. (1-2)



Question 3

Read the passage below and then answer the questions in Sections A to D.

From Vacuum Tubes to Cyber Threats - A Brief Journey Through Computing History

From the electromechanical calculators of Charles Babbage to the room-sized ENIAC, early computers were built around bulky vacuum tubes that consumed kilowatts of power and produced only a few thousand calculations per second. Their introduction nonetheless revolutionised mathematics, ballistics and, later, business data processing; by the 1950s a single Univac I could tabulate a national census in a fraction of the time previously required. The next two decades compressed centuries of innovation: transistors replaced tubes, integrated circuits shrank entire cabinets to chips, and by the late 1970s microprocessors put real computing power on a desktop.

Today's open-source movement rests on a kernel barely imagined in those early years. Linus Torvalds' Linux® core—now more than six million lines of C—organizes its work in tidy subsystems: process manager, memory manager, virtual file system, device-driver layer and network stack. A standardised system-call interface (exposed through glibc) bridges user space and this monolithic yet highly modular heart of the operating system. Because the code is published under the GNU General Public License, thousands of volunteer and corporate engineers can inspect, improve and redistribute it, accelerating evolution in everything from smartphone firmware to super-computer clusters.

But the same connectivity that empowers collaboration also spreads malware at light speed. On 4 May 2000 the ILOVEYOU worm arrived with the disarming subject line "I love you" and, within 24 hours, compromised roughly ten percent of all Internet-connected PCs. By overwriting popular file types and mailing copies of itself to every contact in a victim's address book, the script forced institutions from the Pentagon to the British Parliament to shut down e-mail systems and caused an estimated US $5.5 billion in remediation costs.

For computer engineers, the message is clear: understanding hardware history, kernel design and security pitfalls is no longer optional. Whether you optimise a device driver, audit network code or design social-engineering defences, the discipline demands both technical depth and a broad awareness of how each layer—physical, logical and human—interacts with the next.

Section A – Short-Answer Questions

1. What technological change enabled the transition from first-generation to second-generation computers?
2. Name two subsystems found inside the modern Linux kernel.
3. Which open-source licence governs the Linux kernel's source code, and why is that significant?
4. On what date did the ILOVEYOU worm first appear?
5. Give one reason early users feared electromechanical calculators.

Section B – Long-Answer / Discussion Questions

(Limit your answer to a maximum of 3 lines for each question.)

1. Explain how the monolithic architecture of the Linux kernel can still support modular development.
2. Discuss the impact of social engineering on the rapid spread of the ILOVEYOU worm, providing modern parallels.

3. Compare the computational capabilities of ENIAC with those of a contemporary smartphone, highlighting architectural differences.

Section C – Fill-in-the-Blank Items

1. The first generation of electronic computers relied on __________ tubes for switching.
2. The library that mediates transitions between user space and kernel space in GNU/Linux is called __________.
3. The ILOVEYOU worm was written in the scripting language __________.
4. Linux originally drew inspiration from a teaching operating system known as __________.
5. In kernel code, the acronym VFS stands for __________ __________ __________.

Section D – Multiple-Choice / True–False / Matching

1. **Multiple Choice** – Which layer of the Linux kernel is responsible for abstracting file-system differences?

   A. Process scheduler

   B. Virtual File System

   C. Network stack

   D. Memory manager

2. **Multiple Choice** – Approximately how many lines of code does the Linux kernel contain today?

   A. 60 000

   B. 600 000

C. 6 million

D. 60 million

3. **True or False**

The GNU General Public License allows proprietary forks of the Linux kernel without releasing source code.

4. **Matching** – Match each historical milestone to its approximate decade:

	Milestone	Decade
A	Introduction of integrated circuits	1) 1940s
B	Deployment of ENIAC	2) 1960s
C	Release of Linux 1.0	3) 1990s
D	Popularisation of transistor-based computers	4) 1950s

5. **Multiple Choice** – Which action did not contribute to the damage caused by the ILOVEYOU worm?

A. Overwriting multimedia files
B. Mass-mailing itself to contacts
C. Exploiting UNIX servers
D. Forcing organisations to shut down e-mail systems

Good luck!

English for Computing education team