Declarative programming

Declarative programming is a term with two distinct meanings, both of which are in current use. According to one definition, a program is "declarative" if it describes what something is like, rather than how to create it. For example, web pages are declarative because they describe what the page should look like - title, font, text, and images - but not how to actually display the page on a computer screen. This is a different approach from traditional imperative programming languages such as Fortran, C, and Java, which require the programmer to specify an algorithm to be run. In short, imperative programs make the algorithm explicit and leave the goal implicit, while declarative programs make the goal explicit and leave the algorithm implicit.

According to a different definition, a program is "declarative" if it is written in a purely functional programming language, logic programming language, or constraint programming language. The phrase "declarative language" is sometimes used to describe all such programming languages as a group, and to contrast them against imperative languages.

These two definitions overlap somewhat. In particular, constraint programming and, to a lesser degree, logic programming, focus on describing the properties of the desired solution (the what), leaving unspecified the actual algorithm that should be used to find that solution (the how). However, most logic and constraint languages are able to describe algorithms and implementation details, so they are not strictly declarative by the first definition. Similarly, it is possible to write programs in a declarative style even in an imperative programming language. This is usually done by encapsulating non-declarative details inside a library or framework.

In a declarative program you write (declare) a data structure that is processed by a standard algorithm (for that language) to produce the desired result. When you write a web page for example, you declare what the page should look like in HTML, and the browser's procedural algorithm translates this into the pixels on the display. A declarative language, like all languages, has a syntax describing how the words in the language may be combined, and a semantics describing how sentences in the language correspond to the programs output.

One popular form of declarative programming is its use in domain-specific languages (DSLs). "Domain" in this case refers to the subject matter that the language is intended to describe. For example, HTML is a domain-specific language, whose domain is web pages and hypertext. Other examples of DSLs are spreadsheets, and even email (the "From:" and "To:" headers can be seen as processing instructions).

One drawback of DSLs is that they are often not Turing-complete. That is, there are certain things they cannot do. Just as you cannot use a spreadsheet to send e-mail, you cannot use e-mail to calculate your bank balance. For this reason, DSLs are sometimes embedded inside a general-purpose programming language. This allows a programmer to use the DSL for problems that play to its strengths, and use the general purpose language for problems that are difficult or impossible in the DSL. Stand-alone DSLs - those not embedded in a general purpose language - are often easier to use than an embedded equivalent, since they avoid the added conceptual complexity imposed by the general purpose language.

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**Answer the following questions based on the passage:**

1. According to the passage what is the main difference between imperative and declarative languages?  
   (1 point)

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1. Destination, Purpose
2. Completely
3. Have something in common
4. Summarizing
5. Enforced by
2- In what sense the first definition for the declarative programming differs from the second one? (1 point)

Understanding the passage:
Decide whether the following sentences are true or false (T/F) by referring to the information in the text. (2 points)

1- In a declarative program there is no algorithm to create the output.
2- Domain-specific languages can only be inserted in a general-purpose language to work efficiently.
3- In an imperative program there is no goal to be achieved.
4- Some programming languages imply of both being imperative and declarative

Find Synonyms
Find words in the above passage with the same meaning as: (2 points)

1. prevent
2. capable of operating without others
3. enable
4. plan

Google Hacks!

In the last few years a number of news articles appeared that warned of the fact that hackers (or crackers if you will) make use of the google to gain access to files they shouldn't be allowed to see or have access to. This knowledge is nothing new to some people but personally I have always wondered how exactly a thing like this works. VNUnet’s James Middleton wrote an article in 2001 talking about hackers using a special search string on google to find sensitive banking data. Another article that appeared on 'wired.com' told us how Adrian Lamo, a hacker who made the news often the last couple of years, explained that google could be used to gain access to websites of big corporations.

These articles kept on coming up in the online news. U.S. Military and Government websites were unprotected because admin scripts could be found using google, medical files, personal records, everything suddenly seemed just one google search away. But these articles seemed to show up once every half year and always talked about it as if it was something new. Another thing was the articles never explained how one would actually go about doing this. Almost never an example of a search string was given. The last time I read one of these articles I decided it was time to find out for myself, whether google actually could do all they say it can.

The theory behind this is actually quite simple. Either you think of certain data you would like to acquire and try and imagine in what files this kind of data could be stored and you search for these files directly. (Search for *.xls files for example) Or you take the more interesting approach and you try to think of a certain software that allows you to perform certain tasks or to access certain things and you search for critical files of this software.

Answer the following questions based on the passage:
1- How can search engines like 'google' be helpful for hackers? (1 point)
2- What have you found out about 'Adrian Lamo' from the text? (1 point)

Understanding the passage:
Decide whether the following ideas are stated or not (S/NS) by referring to the information in the text. Justify your answers with extra comments. (2 points)

1- James Middleton was a hacker himself trying to get access into banking data.  

2- The writer has tried 'google' as a tool to find out how it works in exploring restricted areas.

X. 500

Looking at one specific application, X.500 can be described as a White Pages Directory Service used to locate information based upon a name. It will contain information about network users, organizations and system resources. This type of service is required, since the number of networks and distributed systems is continually growing and a name service is needed to serve a similar purpose to telephone directories. Data stored in X.500 servers are organized in a tree structure called a Directory Information Tree (DIT), with named nodes. These nodes hold a range of attributes.

The entire tree with all the attributes is referred to as the Directory Information Base (DIB). The tree can be searched not only on name, but also a combination of attributes. Using distributed systems principles, only one DIB would exist worldwide, but with parts of it being located in individual X.500 servers.

A typical interaction sequence would be for a user (client) to establish a connection with a particular X.500 server and issue requests to it. If the particular server cannot fulfil the user request, because the data are not held in the local segment of the DIB, the contacted server will call other servers or redirect the query to another server. Clients and servers are termed as Directory User Agents (DUAs) and Directory Service Agents (DSAs), respectively. Communication between DSAs is through a Directory System Protocol (DSP), part of the X.500 recommendations.

Which statement best expresses the main idea of the text? Justify your choice with complementary explanations. (1 point)

1- It’s a brief introduction to Directory Systems and primary components involved in their service in general and X.500 in particular.
2- It explains the parts working together to bring directory service to users in details.
3- Tree structures and their use in implementing Directory Systems is the main focus of this text.
4- None.

your reason:
Answer the following questions based on the passage:
1- What does DIT stands for? (1 point)
2- What’s the purpose of using X.500? (2 points)
3- A contacted X.500 server may initiate another connection with other servers. Why? (2 points)

Understanding the passage:
Decide whether the following sentences are true or false (T/F) by referring to the information in the text. Justify your answers with extra comments. (3 points)

1- It’s stated in the text that X.500 is a developed standard for Directory Service.

2- The DIB can only be searched for a particular name of a network user or system resource.

3- There are several Information Bases located in X.500 servers worldwide.

Find Synonyms
Find the words with the same meaning as:
1. Satisfy or Accomplish (Passage A)
2. Whole (Passage A)
3. Characteristic (Passage A)

Parallel Computing

A high performance parallel computer is a computer that can solve large problems in a much shorter time than a single desktop computer. These computers are characterized by fast CPUs, large memory, a high speed interconnect and high speed input/output.

They are able to speed up computations; both by making the sequential components run faster and by doing more operations in parallel. High performance parallel computers are in demand because there is a need for tremendous computational capabilities in science, engineering and business. There are applications that require gigabytes of memory and gigaflops* of performance. The common characteristic of all these complex scientific and business applications is the need to perform computations on large datasets or large equations. Without high performance parallel computers many of these applications could not be run, or they would take an unacceptable amount of time to run.

Today, application scientists are striving for terascale performance, to permit an even larger class of problems to be solved. There are two types of processes that occur in computers and in our daily lives: sequential and parallel. Sequential processes are those that occur in a strict order, where it is not possible to do the next step until the current one is completed. Parallel processes are those in which many events happen simultaneously.

Writing a term paper is an example of a sequential process. First you pick the topic, then you do the research and then you write the paper. You can’t write the paper before you pick the topic. Likewise, you can't write the paper before you research the subject. These steps are carried out in sequential order. An orchestra is an instance of a parallel process. In an orchestra performance every instrument has its own part and plays it sequentially, but all of the instruments playing together in parallel are needed to produce a symphony.
It used to be thought that computer programs were sequential in nature and only a small subset of them lent themselves to parallelism. In fact, the word *algorithm* is defined as the "sequence of steps" necessary to carry out a computation. In the first 30 years of computer use, programs were run sequentially because of this thinking. However the 1980's saw great successes with parallel computers. Dr. Geoffrey Fox published a book entitled "Parallel Computing Works!" that described many scientific accomplishments resulting from parallel computing and led to a reversal in thinking. It is now widely believed that computer programs are parallel in nature and only a small subset of them needs to be run sequentially.

So what exactly is parallel computing? Parallel computing is what a computer does when it carries out more than one computation at a time using more than one processor. While there is a limit to the performance of a single processor, you can increase the performance of your program by using many processors at once. If one processor can perform the arithmetic in time ‘t’, then ideally ‘p’ processors can perform the arithmetic in time ‘t/p’. This ideal performance gain intrigued application scientists as they thought, "What if I use 100 processors? What if I use 1000 processors?" The benefit of parallelism is that it allows researchers to do computations on problems they previously were unable to solve.

Almost every program has some form of parallelism. You need to determine whether your data or your program can be partitioned into independent pieces that can be run simultaneously. *Decomposition* is the name given to this partitioning process. Decomposition gives rise to two types of parallelism: data parallelism and task parallelism.

**Gigaflop**: Giga floating point operations, a unit of measurement used to evaluate processing speed.

Which statement best expresses the main idea of the text? Justify your choice with complementary explanations.

(0.75 point)

1- It describes different aspects of parallel computing as compared with the formerly used sequential one.
2- It is an introductory explanation of parallel programming.
3- Different types of parallelism and their characteristics is the main focus of this text.
4- It tries to stimulate the reader to write parallel programs by repeatedly noting the parallel computing benefits.
5- It tries to make clear when and how it all began and the need to take advantage of parallel computing.
6- None of the above (if this is your choice provide more details!)

*Your reason:*

Answer the following questions based on the passage:

1- In the sentence numbered 5 (previous section) what does *it* refer to? (0.25 point)
2- What’s the primary characteristic of sequential processes? (0.5 point)

3- Can you give an example for an application where without the help of parallel computing the processing time would be unacceptable? (0.25 point)

4- **Load balancing** is the technique of evenly dividing the workload among the processors. How can it affect the performance of parallel processing? (0.5 point)
5- Dr. Fox’s book helped scientists to gain new prospect of computer programs. What was that? (0.25 point)

6- In the final part of the passage mentioned that we have two types of parallelism but the text is interrupted to give further details. By the information gained from the text and your knowledge of computer programs can you accomplish this task? (1 point)

Understanding the passage:
Decide whether the following sentences are true or false (T/F) by referring to the information in the text. (0.5 point)

1- Although computer programs are parallel in nature there exist tasks which should be carried out sequentially.

2- High performance parallel computers decrease the execution time by just doing the processes in parallel.

Decide whether the following ideas are stated or not (S/NS) by referring to the information in the text. Justify your answers with extra comments. (1 points)

1- Running a program on a parallel machine in order to get high performance that is expected requires the developer to reconstruct it and make the necessary changes.

2- It was not until the 1980’s that parallel computing was being taken advantage of.

Find Synonyms
Find the words with the same meaning as: (1 point)

1. Absolute (Paragraph 3)

2. As well (Paragraph 4)

3. Advantage (Paragraph 6)

4. Shared (Paragraph 2)

The D programming Language
Fill the gaps with appropriate words from the following list. Note that some words need to be slightly changed in order to fit in the text. (2 points)

Scale – Meanwhile - Maintain – Purpose - Fit – Retain – Capability - Entire

D is a general ______ systems and applications programming language. It is a higher level language than C++, but ______ the ability to write high performance code and interface directly with the operating system API's and with hardware. D is well suited to writing medium to large ______ million line programs with teams of developers. D is easy to learn, provides many ______ to aid the programmer and is well suited to aggressive compiler optimization technology.
The software industry has come a long way since the C language was invented. Many new concepts were added to the language with C++, but backwards compatibility with C was _________, including compatibility with nearly all the weaknesses of the original design. There have been many attempts to fix those weaknesses, but the compatibility issue frustrates it. _______ both C and C++ undergo a constant accretion of new features. These new features must be carefully ______ into the existing structure without requiring rewriting old code. The end result is very complicated - the C standard is nearly 500 pages and the C++ standard is about 750 pages! The reality of the C++ compiler business is that few compilers effectively implement the _____ standard.

**Find Antonyms**

After completing the above passage find the words with the opposite meaning as:

(1 point)
1. Simple (from the text)
2. Single (from the text)
3. Compatibility (try to make a word by adding proper prefix)
4. Fit (try to make a word by adding proper prefix)

"There is nothing worthwhile on the web, and you will never find it anyway".

This complaint has been voiced since the beginning of the web... and usually by people who had never even tried. From the start of the Internet, there have been directories and lists on various topics maintained by enthusiasts (who were often experts in their fields). My own favourite used to be a list maintained by Scott Yanoff. He started a small list for his personal use in 1991 and found himself being snowballed by e-mail suggestions from grateful users until he became almost an institution, and author of a couple of Internet guides. He seems to have given up in 1995.

By the late 1980s, however, the amount of data was getting too large to rely on helpful hints from other users. From its start in 1983, the Internet had grown to 1000 hosts in 1984, to 10,000 in 1987, to 100,000 in 1990 and to 1,000,000 in 1992. Information retrieval was becoming a bottleneck and a clustering of innovations took place to resolve the problem.

1990 Archie, developed at McGill University (Montreal) first search engine for finding and retrieving computer files. At the time these large institutional computers placed their data and program files into two categories: open and closed. When you 'logged-in' to another computer, you could access the 'open' files by identifying yourself as anonymous and using your e-mail address as the password. Then you could browse through their archive and download any files you wanted.

What Archie did was automatically at night (when the traffic was less) to visit all the archives they knew about and to copy the list into a searchable database (this piece of software was known as a spider). When you logged into an Archie site (by telnet) it would tell you where any file was and you could view and e-mail the results to yourself... and you could go through the entire 'log-in and retrieve' procedures for each computer yourself. It was a striking comment on the state-of-the-art* at the time that McGill soon discovered that half of the whole US-Canada traffic was running through its Archie server, so it shut down public access. By then, however, there were many alternative sites hosting the service.

1991 The Gopher system represented an improvement on FTP retrieval developed at the University of Minnesota (whose mascot* was a golden gopher*). The host computers (servers) put their files in a 'menu' form and the menus of the different servers were merged. Now you logged into any gopher server and you could query it for information by typing in keywords and, again like Archie, you would get a list of items. But now,
instead of sending yourself the list and individually looking up the items, you scrolled down the list, pressed 'enter' and you were transferred directly to the relevant 'gopher' address, where you could read the contents. Then, if you wanted, you sent the file to yourself via e-mail.

Since 'gopher' was a useful way for storing data, the system caught-on very rapidly. And within 'gopherspace' search-engine called Veronica (supposedly Very Easy Rodent-Oriented Network Index to Computerized Archives), developed at the University of Nevada operated on the same principle as Archie but it also allowed you to distinguish between a search for directories and an undifferentiated search combining directories and files (the latter was much larger and time-consuming). Again, having located something, you e-mailed it to yourself.

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**Vocabulary**

State-of-the-art: up to date
Mascot: something (animal, person or a thing) that is supposed to bring good luck
Gopher: Small burrowing rodent (kind of an animal) which digs a hole or tunnel

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• If you are asked to give a very brief description about the text in your own words, what would that be? (1 point)

• Answer the following questions based on the passage:
  3- What are the two **key** differences between the Archie and the Gopher systems according to the passage? (1 point)

  4- What is the ‘Spider’? (0.5 point)

  5- What does ‘its’ refer to in the second paragraph of the passage? (0.25 point)

  6- What was the main problem in the late 80s? (0.5 point)

  7- Can you mark the similarities and differences between the early systems probing information on the Internet and nowadays modern search engines? (1 point)

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**Understanding the passage:**

Decide whether the following sentences are true or false (T/F) by referring to the information in the text. (1.75 point)

• Archie can search the information on the websites and return the results back.
• You can email your request to an Archie and it will email back the reply.
You have to send your email address as the password in order to access closed category of files.

McGill closed Archie in order to reduce the traffic of file downloading on the Internet.

Scott Yanoff began writing guide texts to stop huge load of e-mails from other users.

Gopher server had a menu which was the information within a server categorized for public access.

McGill sudden decision to shut down the service except for the authorized users was the end of Archie’s public appearance.

Decide whether the following ideas are stated or not (S/NS) by referring to the information in the text. Justify your answers with extra comments. (2 points)

1- The increasing factor of servers’ appearance over a decade from the beginning of the Net reached to 1000.

2- Scott Yanoff quit from the Internet community in the mid 90s.

3- Gopher acts as an interface for the entry to the actual server providing your desired information so you don’t have to do the ‘log-in’ process individually.

4- Veronica spends more time on searches for combined files and directories as the result of excessive work to find relevant text and information contained in files.

Find Synonyms

Find the words with the same meaning as: (1 point)

1. Providing storage space (Paragraph 4)
2. Situate (Paragraph 6)
3. Combine (Paragraph 5)
4. Nameless (Paragraph 3)

E-mail is Born

In 1971 Ray Tomlinson of ARPANET sent the World's first e-mail, by adapting an existing, popular, time-share internal mail program and linking it to the new network file transfer technology that underpinned ARPANET's activities. The first message was simply to himself, sent from one computer to another, with the text ‘Testing 1-2-3’. The next thing he did was to send a message to all ARPANET users explaining the availability of ‘electronic mail' and giving instructions on how to send mail to another user using the convention - users' log-in name @ host computer name - which is still the basis of e-mail today.
That was a start, but it was still unbelievably crude. The only way to know what was in a message was to open it in its entirety. The messages had to be read in the ______ they were received. They read as pieces of continuous text (rather like a teletext message today). The reading process and sending process took place ______ two completely separate programs. What was needed was a system to make the entire operation more ______ … a piece-of-cake given the computer expertise concentrated around ARPANET. Innovations followed thick and fast.

**Find Antonyms**

After completing the above passage, find the words with the opposite meaning as:

(0.75 point)

1. Interrupted (from the text)
2. Abandoned (from the text)
3. Available (try to make a word by adding proper prefix)

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**Spyware**

Strictly defined, spyware consists of computer software that gathers and reports information about a computer user without the user's knowledge or consent. More broadly, the term spyware can refer to a wide range of related malware products which fall outside the strict definition of spyware. These products perform many different functions, including the delivery of unrequested advertising (pop-up ads in particular), harvesting private information, re-routing page requests to illegally claim commercial site referral fees, and installing stealth phone dialers.

Spyware as a category overlaps with adware. The more immoral forms of adware tend to unite with spyware. Malware uses spyware for explicitly illegal purposes. Exceptionally, many web browser toolbars may count as spyware.

Data collecting programs installed with the user's knowledge do not, technically speaking, constitute spyware, provided the user fully understands what data they collect and with whom they share it. However, a growing number of legitimate software titles install secondary programs to collect data or distribute advertisement content without properly informing the user about the real nature of those programs. These can drastically impair system performance, and frequently abuse network resources. In addition to slowing down throughput, they are often have design features making them difficult or impossible to remove from the system.

The first recorded use of the term spyware occurred on October 16, 1995 in a Usenet post that poked fun at Microsoft's business model. Spyware later came to refer to spying equipment such as tiny cameras. However, in 1999 Zone Labs used the term when they made a press release for the Zone Alarm Personal Firewall. Since then, computer users have used the term in its current sense. In 2000 Steve Gibson of Gibson Research released the first ever anti-spyware program, OptOut, in response to the growth of spyware, and many more software antidotes have appeared since then.

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**Vocabulary:**

Malware: malicious-logic software (malicious: tendency toward making harmful activities)
Harvest: gather
Stealth: state of being hidden
Drastically: severely
Impair: weaken
Poke fun at: tease, make fun of
Antidote: remedy
Answer the following questions based on the passage:

1- The terms ‘Spyware’, ‘Malware’ and ‘Adware’ where used in a sense that they are sometimes inseparable. Order them from being more general to particular with a brief explanation? (1 point)

2- What primary characteristic should exist in a program that we call a spyware? (1 point)

**Understanding the passage:**

Decide whether the following sentences are true or false (T/F) by referring to the information in the text. (2 points)

1- Spyware may degrade the system performance or network resources like worms.
2- The first spyware program appeared in 1995.
3- Once installed spyware can not be removed because of their design features.
4- Legitimate programs trying to collect data from the user are considered spyware.

Decide whether the following ideas are stated or not (S/NS) by referring to the information in the text. Justify your answers with extra comments. (2 points)

1- The term spyware was around for a decade but it got its contemporary meaning afterwards.

2- This is not a good idea to install web browsers that are packed with additional toolbars.

**Find Synonyms**

Find the words with the same meaning as: (1 point)

1. If
2. approval
3. to have something in common
4. considered

Find appropriate words from the following list. **Note that** some words need to be slightly changed in order to fit in the text. (1 points)

Scale – Interaction - Maintain – Purpose - Store – Client – Drawback - Server

**The Mailing List**

A newsgroup places all the news on a _______ and the reader selects what he or she wants to read. In a list, specific items of news are sent to all readers who have indicated previously that they want to receive it. From the moment that e-mail facilities allowed users to _______ addresses and to forward messages to everyone on a specific address list, it was possible to construct lists.
Arpanet's 'newsgroups' were really lists and many other networks that emerged in the 1980s also had people that ran lists devoted to specific subjects. The _______ lay in the fact that all these operations had to be performed manually, making the success of a list dependent upon the hard work of the list's moderator. Added to the human factor, lists were prone to all the normal frustrations associated with slow/failed connections, especially on the oversaturated transatlantic cables. Improved infrastructure would remove the second of these problems, human skillfulness the **first**.

In 1985 Eric Thomas (an American computer student working in Paris) designed the first automatic readdressing system but it was slow, primitive and allowed no _______. Moreover, the initial contacts were all through human agencies. Within a year, however, he had added a user-interface system (including passwords and security checks) and could process all the requests that the previous machines were performing manually. Moreover, the interfaces were duplicated (so, with a machine in Europe, messages only had to cross the Atlantic once, to an American mirror). The system became operational in June 1986 and by the end of the year it was serving 41 lists. Eighteen months later there were 1000 lists on the system.

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**Vocabulary:**

Emerge: come out  
Moderator: a person responsible for determining which email submissions should be passed on to the list.  
Frustration: disappointment  
Oversaturated: filled over the capacity  
Transatlantic: across the Atlantic Ocean  
Infrastructure: foundation, basis

After completing the above passage answer the following questions based on it:

1. What is the primary difference between a newsgroup and a mailing list? (1 point)

2. The word ‘first’ at the end of the second paragraph refers to what? (1 point)

**Synonyms/Antonyms**

Find words with the similar meaning to: (1 point)
- Dedicated to
- Copied

Find words with the opposite meaning to: (1 point)
- Free from
- Sophisticated

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**C++**

Bell Labs' Bjarne Stroustrup developed C++ (originally named "C with Classes") in 1983 as an enhancement\(^9\) to the C programming language. Enhancements started with the addition of classes, followed by, among many features, virtual functions, operator overloading, multiple inheritance, templates, and exception handling. The

\(^9\) Improvement
C++ programming language standard was authorized in 1998 as ISO/IEC 14882:1998, the current version of which is the 2003 version. A new version of the standard (known informally as C++0x) is being developed.

Stroustrup began work on C with Classes in 1979. The idea of creating a new language originated from Stroustrup's experience programming for his Ph.D. thesis. Stroustrup found that Simula had features that were very helpful for large software development but was too slow for practical uses, while BCPL was fast but too low level and unsuitable for large software development. When Stroustrup started working in Bell Labs, he had the problem of analyzing the UNIX kernel with respect to distributed computing. Remembering his Ph.D. experience, Stroustrup set out to enhance the C language with Simula-like features. C was chosen because it is general-purpose, fast, and portable. Besides C and Simula some other languages which inspired him were: ALGOL 68, Ada, CLU and ML. At first, class, derived class, strong type checking, inlining, and default argument were features added to C. The first commercial release occurred in October 1985.

In 1983, the name of the language was changed from C with Classes to C++. This name is credited to Rick Mascitti (mid-1983) and was first used in December 1983. The final name stems from C's "++" operator (which increments the value of a variable) and a common naming convention of using "+" to indicate an enhanced computer program. According to Stroustrup: "the name signifies the evolutionary nature of the changes from C". C+ was the name of an earlier, unrelated programming language. Following the prefix and postfix conventions in C, a more proper name for C++ might actually be +C. However, c++ and ++c both increment c, and, on its own line, the form c++ is more common than ++c. However, the introduction of C++ did not change the C language itself, so an even more accurate name might be "C+1". When Rick Mascitti was questioned informally in 1992 about the naming, he indicated that it was given in a tongue-in-cheek spirit. He never thought that it would become the formal name of the language.

C++ continues to evolve to meet future requirements. One group in particular, Boost.org, works to make the most of C++ in its current form and advises the C++ standards committee as to which features work well and which need improving. Current work indicates that C++ will capitalize on its multi-paradigm nature more and more. The work at Boost.org, for example, is greatly expanding C++'s functional capabilities. The C++ standard does not cover implementation of exception handling, and other implementation-specific features, making object code produced by different compilers incompatible; there are, however, 3rd-party standards for particular machines or OSs which attempt to standardize compilers on those platforms. No one owns the C++ language; it is royalty-free. The standard document itself is, however, not available for free.

Answer the following questions based on the passage:

1- What was the problem that inspired Stroustrup to improve the C programming language? (1 point)

2- What makes the object codes produced by different compilers incompatible? (0.5 point)

Understanding the passage:

Decide whether the following sentences are true or false (T/F) by referring to the information in the text. (2 points)

1- It took more than a decade until the standard for the C++ language was released with the language itself being in use for a while.
2- Three approved versions of the C++ language standard are released already.
3- Among the languages that inspired the development of C++, Simula was the major candidate.
4- The standard version of the C++ compiler is not available for free.

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10 Motivate, encourage
11 Comes from
12 Model, Pattern
**Computer Worms**

Fill the gaps with appropriate words from the following list. Note that some words need to be slightly changed in order to fit in the text. (1 points)

A computer worm is a self-replicating computer program, similar to a computer virus. A virus _______ itself to, and becomes part of, another executable program; however, a worm is self-contained and does not need to be part of another program to propagate itself. They are often designed to exploit the file transmission capabilities found on many computers. The main difference between a computer virus and a worm is that a virus cannot propagate by itself whereas worms can. A worm uses a network to send copies of itself to other systems and it does so without any intervention. In general, worms harm the network and consume bandwidth, whereas viruses infect or corrupt files on a targeted computer. Viruses generally do not affect network performance, as their malicious activities are mostly restricted within the target computer itself.

The name ‘worm’ was taken from The Shockwave Rider, a 1970s science fiction novel by John Brunner. Researchers writing an early paper on experiments in distributed computing noted the similarities between their software and the program described by Brunner and adopted the name. The first implementation of a worm was by two researchers at Xerox PARC in 1978. The authors, John Shoch and Jon Hupp, originally designed the worm to find idle processors on the network and assign them tasks, sharing the processing and so improving the whole network efficiency.

The first worm to attract wide attention, the Morris worm, was written by Robert Tappan Morris, who at the time was a graduate student at Cornell University. It was released on November 2, 1988, and quickly _______ a great number of computers on the Internet at the time. It propagated through a number of bugs in BSD Unix and its derivatives. Morris himself was convicted under the US Computer Crime and Abuse Act and received three years probation, community service and a fine in excess of $10,000.

In addition to replication, a worm may be designed to do any number of things, such as delete files on a host system or send documents via email. A worm can wreak havoc just with the network traffic generated by its reproduction. Mydoom, for example, caused a noticeable worldwide Internet slowdown at the peak of its _______.

Whether worms can be useful is a common theoretical question in computer science. The Nachi family of worms, for example, tried to download then install patches from Microsoft’s website to fix various vulnerabilities in the host system — the same vulnerabilities that they exploited. This eventually made the systems affected more secure, but generated considerable network traffic (often more than the worms they were protecting against), rebooted the machine in the course of patching it, and, maybe most importantly, did its work without the explicit _______ of the computer’s owner or user. As such, most security experts disapprove worms, whatever their effect.

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13 Take advantage of
14 Test period
15 Damage
16 Susceptibility
Answer the following questions based on the passage:

1. What is the major dissimilarity between a virus and a worm? (1 point)

2. Why Morris worm attracted wide attention? (1 point)

Decide whether the following ideas are stated or not (S/NS) by referring to the information in the text. Justify your answers with extra comments. (2 points)

1- There exist worms that are not targeted to decrease system performance; however their side effects can cause trouble which is considered unacceptable by computer experts.

2- The term ‘worm’ was previously used when two researches at Xerox PARC published their experimental results in late 70s.

**Synonyms**
Find words from the above passage with the similar meaning to: (0.5 point)
- Interference
- More than

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**PDAs**

Fill the gaps with appropriate words from the following list. **Note that** some words need to be slightly changed in order to fit in the text. (1 points)

Advantage – Base on - Consider – Include – Client – Drawback - Consume

Personal Digital Assistants (PDAs or palmtops) are handheld devices that were originally designed as personal organizers, but became much more versatile\(^{17}\) over the years. A basic PDA usually includes a clock, date book, address book, task list, memo pad and a simple calculator. One major drawback of using PDAs is their ability to synchronize data with desktop, notebook and desknote computers.

The term ‘PDA’ was coined\(^{18}\) on 7 January 1992 by John Sculley at the Consumer Electronics Show in Las Vegas, Nevada, referring to the ‘Apple Newton’, though earlier devices like the Psion and Sharp Wizard have the functionality to be multi-purpose PDAs.

According to a ‘Gartner’ market study, the overall market for PDAs shrunk\(^{19}\) by 5% in the first quarter\(^{20}\) (Q1) of 2004, compared to Q1 2003, with market share resolving\(^{21}\) as follows (by operating system):

\(^{17}\) multi-purpose
\(^{18}\) invent a new word or phrase
\(^{19}\) become smaller

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• Palm OS for palmOne PDAs and some other - 40.5% (stable)
• Windows Mobile for PDAs that comply with\textsuperscript{22} the Microsoft's Pocket PC specifications - 40.4% (slightly increasing)
• BlackBerry OS for BlackBerry PDA (produced by Research In Motion) - 14.8% (strongly increasing)
• Various operating systems _______ the Linux kernel for various special designed PDAs (many other supported) - 1.9% (stable)
• Other - 2.4% (strongly decreasing)

The reason usually stated for this decline is the growing capabilities of smartphones, mobile phones with PDA-like communication abilities.

Email

Electronic mail, abbreviated e-mail or email, is a method of composing, sending, storing, and receiving messages over electronic communication systems. The term e-mail applies both to the Internet e-mail system based on the Simple Mail Transfer Protocol (SMTP) and to intranet systems allowing users within one company or organization to send messages to each other. E-mail predates the Internet; existing e-mail systems were a crucial tool in creating the Internet. E-mail started in 1965 as a way for multiple users of a time-sharing mainframe computer to communicate. Although the exact history is murky\textsuperscript{24}, among the first systems to have such a facility were SDC's Q32 and MIT's CTSS.

The ARPANET computer network made a large contribution to the evolution of e-mail. Ray Tomlinson initiated the use of the '@' sign to separate the names of the users and their machines in 1971. The common report that he invented e-mail is an exaggeration, although his early e-mail programs SNDMSG and README were very important. The first message sent by Ray Tomlinson is not preserved; it was a message announcing the availability of network email. The ARPANET significantly increased the popularity of e-mail, and it became the killer app\textsuperscript{25} of the ARPANET.

E-mail was originally designed for 7-bit ASCII. Much e-mail softwares are 8-bit clean\textsuperscript{26} but must assume it will be communicating with 7-bit servers and mail readers. The MIME standard introduced character set specifiers, and two content transfer encodings to encode 8 bit data for transmission. For international character sets, Unicode is growing in popularity. Mail can be stored either on the client or on the server side. Standard formats for mailboxes include Maildir and mbox. Several prominent\textsuperscript{27} e-mail clients use their own, proprietary format, and require conversion software to transfer e-mail between them. When a message cannot be delivered, the recipient MTA (Message Transfer Agent) must send a bounce\textsuperscript{28} message back to the sender, indicating the problem.

The usefulness of e-mail is being threatened\textsuperscript{29} by three phenomena\textsuperscript{30}: spamming, phishing and e-mail worms. Spamming is unsolicited\textsuperscript{31} commercial e-mail. Because of the very low cost of sending e-mail, spammers can send hundreds of millions of e-mail messages each day over an inexpensive Internet connection. Hundreds of active spammers sending this volume of mail results in information overload for many computer users who

\textsuperscript{20} three months
\textsuperscript{21} separating into parts
\textsuperscript{22} agree to
\textsuperscript{23} Very important
\textsuperscript{24} dark
\textsuperscript{25} An application that actually makes a supporting market for a promising but under-utilized technology
\textsuperscript{26} A term meaning that the "data is fully encrypted". Each byte, all 8 bits, is handled in a manner to fully code it for transmission
\textsuperscript{27} Famous
\textsuperscript{28} Jump, skip
\textsuperscript{29} Put at risk
\textsuperscript{30} Something unusual
\textsuperscript{31} Unrequested
receive tens or even hundreds of junk messages each day. E-mail worms use e-mail as a way of replicating themselves into vulnerable computers. Although the first e-mail worm affected UNIX computers, the problem is most common today on the more popular Microsoft Windows operating system. The combination of spam and worm programs results in users receiving a constant drizzle of junk e-mail, which reduces the usefulness of e-mail as a practical tool.

Answer the following questions:

1. What is the role of conversion softwares in email transmission between clients? (0.5 point)

2. What kind of phenomena is in the main attention of the text? (0.5 point)

Decide whether the following statements are true or false according to the passage: (2 point)

- Most believe that Ray Tomlinson created email but that not the case.
- Sending a handful of emails does not require a high bandwidth connection.
- Modern email softwares should support the old ASCII standard, otherwise they may meet problems.
- It is exactly known that when and where email originated.

Decide whether or not the following ideas are stated in the passage- justify your answers. (2 points)

1. Users are informed whether or not their emails have been delivered.

2. Emails are originally stored in the mail server but if transferred down to the client side it won't be accessible from the server again due to the removal.

Synonyms

Find words from the above passage with similar meaning to: (1 point)

- overstatement
- frequent

Data Mining

Data Mining can be defined as "The nontrivial\textsuperscript{32} extraction of implicit, previously unknown, and potentially useful information from data" and "The science of extracting useful information from large data sets or databases". Although it is usually used in relation to analysis of data, data mining, like artificial intelligence, is an umbrella term and is used with varied meanings in a wide range of contexts. It is usually associated with a business or other organization's need to identify trends\textsuperscript{33}. Data mining involves the process of analyzing data to show patterns or relationships; sorting through large amounts of data; and picking out pieces of relative information or patterns that occur e.g., picking out statistical information from some data.

A simple example of data mining is its use in a sales department. If a store tracks\textsuperscript{34} the purchases of a customer and notices that a customer buys a lot of silk shirts, the data mining system will make a relation between that customer and silk shirts. The sales department will look at that information and may begin direct mail marketing of silk shirts to that customer, or it may alternatively attempt to get the customer to buy a wider range of products. In this case, the data mining system used by the store discovered new information about the customer that was previously unknown to the company.

\textsuperscript{32} Not minor
\textsuperscript{33} Tendency
\textsuperscript{34} Follows
Essentially, data mining gives information that would not be available otherwise. It must be properly interpreted to be useful. When the data collected involves individual people, there are many questions concerning privacy.

By the information gained from the passage about the 'Data Mining', think of and give a simple example concerning the application of 'Data Mining'. (2 Points)