PROGRAMMING AND PROGRAMMING LANGUAGES

INTRODUCTION | REFLECTIONS OF THE PROCESS OF CREATING SOFTWARE

1 Working with a partner reflect on the following questions:

1 What do you think are the main stages involved in the programming process?

....

2 What are some responsibilities of a software engineer?

....

3 What programming languages are you familiar with? How are / can they be categorized?

....

VOCABULARY & SPEAKING | PROGRAMMING (LANGUAGES) AND PARADIGMS

2 Match the terms below with their definition:

1	flowchart	**a**	any programming language optimized for modelling real-world objects and concepts.
2	source code	**b**	a low-level programming language for a computer;
3	compiler	**c**	program instructions written in a particular computer language;
4	machine code	**d**	a special program which converts the source program into machine code;
5	debugging	**e**	a programming language that supports both procedural and object-oriented programming philosophies;
6	assembly language	**f**	a programming language with strong abstraction from the details of the computer;
7	high-level language	**g**	a system for annotating a document in a way that is syntactically distinguishable from text;
8	markup language	**h**	a program that executes instructions written in a high-level language without compiling it first;
9	interpreter	**i**	a diagram representing the successive logical steps of the program
10	multi-paradigm language	**j**	the basic instructions understood by computers; it consists of 1s and 0s;
11	procedural language	**k**	any programming language that is based on a step-by-step approach to solving a problem
12	object-oriented language	**l**	the techniques for detecting and correcting errors which may occur in programs;

1	2	3	4	5	6	7	8	9	10	11	12

3 Fill in the gaps in the following sentences by choosing the appropriate word from the following list:

load module	object program	compiler	linkage editor
object module	source program	applications program	machine code

1 A _____ is a program written in one of the high-level languages.

2 A program written in a high-level language must be interpreted into _____ before the computer can read and process it.

3 A program designed to perform a specific task is called a(n) _____.

4 The _____ or _____ is the program produced when the original program has been converted into machine code.

5 A _____ is a program that converts a high-level language into machine code.

6 The system program which fetches required system routines and links them to the object module is known as the _____.

7 The _____ is the program directly executable by the computer

4 Work in pairs, A and B. You each have information about some popular programming languages. Read the information on your cards then work together to identify the language described in (A - I) below:

A a software framework by Microsoft which executes code via a virtual machine _____

B a high-level, compiled, object-oriented programming language developed by Sun Microsystems _____

C a high-level, interpreted programming language, typically used for a wide variety of programming tasks including system administration _____

D a high-level, interpreted programming language developed in the 1980's at CWI in the Netherlands _____

E a popular web page scripting language created by Brendan Eich at Netscape to provide client-side interactivity in web pages _____

F a low-level, compiled programming language developed in the early 1970's for use on the UNIX operating system _____

G   an object-oriented, high-level, interpreted language, developed in the 1990's by Japanese programmer Yukihiro Matsumoto _____

H   a high-level, interpreted programming language written in the mid-1990's

and aimed mainly at web developers creating dynamic web applications _____

I   a Windows-only, multi-paradigm language developed by Microsoft _____

5   Together decide what would be the most appropriate language to use for each of these situations. Give reasons for your answers.

1   A lecturer who wants to prepare his / her students to become great structural thinkers and masters of object-oriented programming.

2   A student wants to create a dynamic webpage for a personal website.

3   A professional programmer wants to create and sell a program for use in language learning.

4   A website designer wants to password-protect a section of a website.

5   A systems programmer wants to add new modules to an operating system.

6   A website designer wants to enable the data on his website to be easily processed by a number of different programs.

7   A website designer wants to enable the data on his website to be easily processed by a number of different programs.

8   The owner of a small business wants to create a simple database program to keep track of his stock.

9   A professional programmer wants to create and sell a program for use in language learning.

10 A website designer wants to password-protect a section of a website.

READING & SPEAKING | PUTTING KNOWLEDGE TO WORK

6   Working with a partner, reflect on the following questions:

1   What are some career options that people who learn computer science can choose to have? Name a few options.

2   For each of the career options that you choose what technical skills and personal qualities do you think would be needed?

3   Which of the career options would you most like to have?

7   Work in groups of three: A, B and C. Each member of your group should read one text, i.e. A, B or C and complete the table below with appropriate information:

		A	B	C
1	**job title**			
2	**nature of work**			
3	**formal qualification**			
4	**personal qualities**			
5	**technical skills**			
6	**how to get started**			
7	**how to make progress**			

TEXT A

How to become a programming expert

The primary requirements for being a good programmer are nothing more than a good memory, attention to detail, a logical mind and the ability to work through a problem in a methodical manner breaking tasks down into smaller, more manageable pieces.

However, it's not enough just to turn up for a job interview with a logical mind as your sole qualification. An employer will want to see some sort of formal qualification and a proven track record. But if you can show someone an impressive piece of software with your name on it, it will count for a lot more than a string of academic qualifications.

So what specific skills are employers looking for? The Windows market is booming and there's a demand for good C, C++, Delphi, Java and Visual Basic developers. Avoid older languages such as FORTRAN and COBOL unless you want to work as a contract programmer.

For someone starting out, my best advice would be to subscribe to the programming magazines such as Microsoft's Systems Journal. Get one or two of the low-cost 'student' editions of C++, Visual Basic and Delphi. Get a decent book on Windows programming. If you decide programming is really for you, spend more money on a training course.

TEXT B

How to become a Computer Consultant

The first key point to realize is that you can't know everything. However, you mustn't become an expert in too narrow a field. The second key point is to differentiate between contract work and consultancy. Good contractors move from job to job every few months. A consultant is different. A consultant often works on very small timescales – a few days here, a week there, but often for a core collection of companies that keep coming back again and again.

There's a lot of work out there for people who know Visual Basic, C++, and so on. And there are lots of people who know it too, so you have to be better than them. Qualifications are important. Microsoft has a raft of exams you can take, as does Novell, and in my experience these are very useful pieces of paper. University degrees are useless. They merely prove you can think, and will hopefully get you into a job where you can

learn something useful. Exams like Microsoft Certified Systems Engineer are well worth doing. The same goes for Novel Linux Certification. However, this won't guarantee an understanding of the product, its positioning in the market, how it relates to other products and so on. That's where the all-important experience comes in.

Here's the road map. After leaving university you get a technical role in a company and spend your evenings and weekends learning the tools of your trade – and getting your current employer to pay for your exams. You don't stay in one company for more than two years. After a couple of hops like that, you may be in a good position to move into a junior consultancy position in one of the larger consultancy companies. By the age of 30, you've run big projects, rolled out major solutions and are well known. Maybe then it's time to make the leap and run your own life.

TEXT C

How to become an IT Manager

IT managers manage projects, technology and people. Any large organization will have at least one IT manager responsible for ensuring that everyone actually needs a PC has one and that it works properly. This means taking responsibility for the maintenance of servers and the installation of new software, and for staffing a help-desk and a support group.

Medium to large companies are also likely to have an IT systems manager. They are responsible for developing and implementing computer software that supports the operations of the business. They're responsible for multiple development projects and oversee the implementation and support of the systems. Companies will have two or three major systems that are probably bought off the shelf and then tailored by an in-house development team.

Apart from basic hardware and software expertise, an IT manager will typically have over five years' experience in the industry. Most are between 30 and 45. Since IT managers have to take responsibility for budgets and for staff, employers look for both of these factors in any potential recruit.

Nearly all IT managers have at least a first degree if not a second one as well. Interestingly, many of them don't have degrees in computing science. In any case, the best qualification for becoming a manager is experience. If your personality is such that you're unlikely to be asked to take responsibility for a small team or project, then you can forget being an IT manager. You need to be bright, communicative and be able to earn the trust of your teams. Most of this isn't taught, so if you don't have these skills then divert your career elsewhere.

8   Now share information orally about your text with others in your group to complete the table for each of the occupations described.

9 **For which of the careers described are these statements true? More than one career may match each statement.**

1 You may work for only a few days or a week for a company. _____

2 It's a good idea to buy books on languages such as C++. _____

3 You are responsible for developing and implementing the software a company needs to run its operations. _____

4 You need to be able to break down a problem into a number of smaller tasks. _____

5 It's worth paying for a training course if you get serious about this career. _____

6 Microsoft Certified Systems Engineer is a useful qualification for your career. _____

7 Your objective is to become self-employed. _____

8 It's important you have the right personality to lead a team _____

10 **Do you agree with the statements made about the requirements of the different types of jobs as described in the text above? What would you change and why?**

GRAMMAR | MODAL VERBS

11 **Modal verbs in English can be used in various ways to talk about possibility, certainty, ability, obligations etc. They are often used when specifying requirements for particular jobs - an issue we will look at today. Answer the following questions:**

1 What modal verbs would you use to talk about requirements for a job?

2 Which of the modal verbs - that you thought of as an answer to the question above - are used to talk about essential requirements? Which are used to talk about desirable requirements?

3 What modal verbs can be used to talk about things which are not required?

12 **Fill in the blanks with the appropriate form of the verbs *need to, have to* and *must*, to make sensible statements. More than one answer is possible in some examples.**

1 Technical qualifications _____ to be renewed at intervals to ensure they do not go out of date.

2 You _____ become an expert in too narrow a field.

3 You _____ to have good communication skills to become an IT Manager.

4 You _____ be an expert in hardware to become a programmer.

5 You _____ have worked with IBM mainframes for at least two years.

6 You _____ be able to show leadership.

7 You _____ have a degree but it _____ be in computing science.

8 You _____ to have experience in JavaScript.

9 You _____ be able to use C++.

10 These days you _____ study BASIC.

13 **In the list below you will find certain adjectives that can be used to talk about personal qualities. Read them and make sure you understand what they mean:**

dependable	*adaptable*	*conscientious*	*determined*	*resourceful*	*loyal*
personable	*creative*	*proactive*	*motivated*	*experienced*	*patient*

14 **Which three of the qualities do you think are most important for a computer programmer to have? Which three would you say are the least important? Write three sentences using appropriate modal verbs to reflect your views.**

GROUP WORK | TECHNICAL AND PERSONAL SKILLS

15 **Work in pairs or small groups. Think about one possible career in software development, do some research, if necessary and write a short paragraph about it, making sure to include details regarding the nature of the job, the qualifications, personal qualities and technical skills that would be needed for someone choosing that career to be successful in her / his own job. Present your paragraph to the class.**

WRITING | LETTERS OF APPLICATION

16 **Reflect on the following questions:**

1 Have you ever written a letter of application? How did you write it? What was the most challenging aspect of writing it?

2 What is the main purpose of writing a letter of application?

3 What type of information should a letter of application contain? What should you focus on more and what is better left out?

When writing a letter of application for a job or course of study, it is important to include only information that is relevant to the particular job you are applying for. It is also important to use exactly the right tone, otherwise the application will be rejected. Typically, such letters contain some or all of the following:
• the name of the job / course you are applying for
• where you saw it advertised
• what you are doing now
• what work experience you have
• your academic qualifications
• the personal qualities which make you suitable for the job

2 Put the following into the correct spaces in the plan below and add other ideas of your own.

- *degree in mathematics*   • *enclose two referents*
- *Office Manager*   • *capable and trustworthy*
- *course in office management*   • *Senior Clerk*
- *on your company's website*   • *full driving license*
- *put my experience to greater use*

Name of post..

Where advertised ....

Present job ....

Duties / Responsibilities ....

Academic qualifications ....

Other skills / Qualifications ....

Personal Qualities ....

Reason for wanting the job ....

Closing remarks ....

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17 Read the rubric below and underline the key words. Then answer the questions below

A position has become vacant in the head office of the company where your work. Applicants are asked to send in their CV, accompanied by a letter stating why they are interested in the job. The job is similar to what you are already doing but it involves more responsibility and is to be considered a promotion. You feel you are capable of doing the job and you are ready for a new challenge.

Write a letter of application, saying why you feel you should be considered for the job.

1 How would you begin your letter?

2 Where might you have seen it advertised?

3 How might your experience be useful for this job?

4 What relevant qualifications / personal qualities can you mention for this job?

5 Which of the following do you think you should do in your letter?

a		exaggerate your qualifications, including every detail
b		mention that you are keen on the idea of progressing
c		refer to previous occasions when you were turned down for promotion
d		say what you have done for the company so far
e		express your concerns about taking on extra responsibilities
f		comment on what you think is wrong with the company
g		express confidence in your own abilities

STUDENT A		STUDENT B	
Java	Java uses a compiler, and is an object-oriented language released in 1995 by Sun Microsystems. Java is the number one programming language today for many reasons. First, it is a well-organized language with a strong library of reusable software components. Second, programs written in Java can run on many different computer architectures and operating systems because of the use of the JVM (Java Virtual Machine). Third, Java is the language most likely to be taught in university computer science classes. A lot of computer science theory books written in the past decade use Java in code examples. So learning Java syntax is a good idea even if you never actually code in it. Java Strengths: WORA, popularity Java Weaknesses: Slower than natively compiled languages	**PHP**	PHP uses a run-time interpreter, and is a multi-paradigm language originally developed in 1996 by Rasmus Lerdorf to create dynamic web pages. At first it was not even a real programming language, but over time it eventually grew into a fully featured object-oriented programming language. Although PHP has been much criticized for being a bit sloppy and insecure, it's been pretty good since version 5 came out in 2004. It's hard to argue with success. Today, PHP is the most popular language used to write web applications. Strengths: web programming, good documentation Weaknesses: inconsistent syntax, too many ways to do the same thing, a history of bizarre security decisions
C	C is a compiled, procedural language developed in 1972 by Dennis Ritchie for use in the UNIX operating system. Although designed to be portable in nature, C programs must be specifically compiled for computers with different architectures and operating systems. This helps make them lightning fast. Although C is a relatively old language, it is still widely used for system programming, writing other programming languages, such as embedded systems. Strengths: Speed Weaknesses: Memory management can be difficult to master	**C++**	C++ is a compiled, multi-paradigm language, written as an update to C in 1979 by Bjarne Stroustrup. It attempts to be backwards-compatible with C and brings object-orientation, which helps in larger projects. Despite its age, C++ is used to create a wide array of applications from games to office suites. Strengths: Speed Weaknesess: C++ is older and is considered to be more clumsy than newer object-oriented languages such as Java or C#
VB	VB (or Visual Basic) is an interpreted, multi-paradigm language developed by Microsoft Corporation for the Windows platform. It has been evolving over the years and is seen as a direct descendant of Microsoft's old BASIC from the 1970's. Visual Basic is a good language for scripting Windows applications that do not need the power and speed of C#. Strengths: none Weaknesses: Only runs in Windows	**Python**	Python is an interpreted, multi-paradigm language written by Guido van Rossum in the late 1980's and intended for general programming purposes. Python was not named after the snake, but actually after the Monty Python comedy group. Python is characterized by its use of indentation for readability, and its encouragement for elegant code by making developers do similar things in similar ways. Python is used as the main programming choice for both Google and Ubuntu. Strengths: excellent readability and overall philosophy Weaknesses: None
Ruby	Ruby is an interpreted, object-oriented language written by Yukihoro Matsumoto around 1995. It is one of the most object-oriented languages in the world. Everything is an object in Ruby, even letters and number can have method calls. It's a great language to learn if you love objects. The only negative is that its love of object-orientation makes it a bit slow, even for an interpreted language. Strengths: perhaps the world's most object-oriented language Weaknesses: its superior object model comes at a price - speed	**C#**	C# is a compiled, object-oriented language written by Microsoft. It is an open specification, but rarely seen on any non-Windows platform. C# was conceived as Microsoft's premium language in its .NET Framework. It is very similar to Java in both syntax and nature. Strenths: Powerful and pretty fast. Weaknesses: Only really suitable for Windows
Perl	Perl is an interpreted, multi-paradigm language written by Larry Wall in 1986. It is characterized by a somewhat disorganized and scary-looking syntax which only makes sense to other PERL programmers. However, a lot of veteran programmer love it and use it every day as their primary language. Ten years ago, Perl was more popular than it is today. What happened? A lot of newer programmers and even old Perl programmers have switched to other languages, such as PHP, Python and Ruby. Perl is perhaps still the best language for text processing and system administration scripting. Strengths: text processing and system administration Weaknesses: strange syntax, and perhaps too many ways to do the same thing	**Java Script**	JavaScript is an interpreted, multi-paradigm language. A very strange one too. Despite its name, it has nothing whatsoever to do with Java. You will rarely, if ever see this language outside of a web browser. It is basically a language meant to script behaviours in web browsers and used for things such as web form validation and AJAX style web applications. The trend in the future seems to be building more and more complex applications in JavaScript, even simple online games and office suites. The success of this trend will depend upon advancements in the speed of a browser's JavaScript interpreter. If you want to be correct, the real name of this programming language is EXMAscript, although most notably actually calls it this. Strengths: it's the only realiable way to do client-side web programming Weaknesses: it's only really useful in a web browser

18 **Put the parts below into the correct order to make a complete email for someone applying for a job.**

A   the summer programme where I worked last year. I am available for interview in Naples any weekday afternoon, and you can email

B   as a Word document. You will notice that I have supervised children on a range of sports and cultural activities as well as dealing

C   Dear Sir / Madam // With reference to your advertisement on the JobFinders.com website, I am interested in applying

D   as I enjoy working with young people. I have a lot of energy and enthusiasm and am also responsible and reliable. I have attached my CV

E   First Certificate grade A. I would be grateful if you could consider my application. You will see

F   the travel industry. During the last few summer holidays I have

G   for the post of tour leader for Italian school students. I am 26 years old and am currently studying

H   me or telephone me on the number below. I look forward to hearing from you soon. Yours faithfully

I   for a diploma in Tourism at Naples University. After that I hope to follow a career in

J   in the job of your leader, taking students to London. I feel that I would be well-suited for this job

K   to do something more varied and challenging, and for this reason I am interested

L   with transport arrangements and tickets. You will also notice that my English is good and I have

M   from my attached CV that two people can be contacted as references, one is a university professor and the other is from

N   worked as a youth leader in Italy, and I enjoyed the work very much. Next summer I would like

1	2	3	4	5	6	7	8	9	10	11	12	13	14
C													

19 **The email in the previous section is one long paragraph. Show where the new paragraphs could begin by writing a // symbol in the text. The structure below will help you.**

1   **Greeting**

2   **Reason for writing**

For example: where (and when) you saw the advertisement and which job you are interested in.

3   **Your background and experience**

For example: your age (optional); present job and / or studies; your qualifications (or if you are a student what you hope to do in the future); a description of your recent work experience.

4   **The job**

For example: mention the skills and personal qualities that make you suitable for this job

5   **Refer to your CV**

Ask the reader to look at your CV / Resume, and focus on one or two key points.

6   **Final comments**

For example: say that you hope your application will be considered; say who will give you a reference; say when you are available for interview; say how you can be contracted.

7   **Standard final sentence**

8   **Formal ending**

20 **Complete the sentences with one of the words:** *as, at for, from, in of, on to*

1   With reference _____ your advertisement _____ the JobFinders.com website, I am interested _____ applying _____ the post of tour leader.

2   I have attached my CV _____ a Word document.

3   I am available _____ interview _____ Naples.

4   I'm looking _____ a sales representative at the moment.

5   You can email me or telephone me _____ the number given _____ my CV.

6   I look forward _____ hearing _____ you soon.

7   I have a good knowledge _____ business administration. I studied it _____ university.

8   I'm unemployed _____ the moment. I've been out _____ work since the summer.

9   I'm studying _____ a degree _____ Environmental Studies.

10   I hope to follow a career _____ the legal profession.

11   I have been working _____ Telekom for one year.

12   I attach my CV _____ requested.