

Computer Science 340

Operating Systems

FIRST TEST

1990

READ THIS FIRST !!!!!!!!!!!!!!!

Answer all questions.

Make sure your name is on every piece of paper which you hand in.

All questions carry the same number of marks.

Within questions 1 and 2, the number of asterisks (*) shown against each part is proportional to the number of marks allocated to that part.

There are THREE questions; the test lasts for 45 minutes. Allowing some time to read the questions, that leaves rather less than 15 minutes per question. I do not expect half-hour answers.

I expect answers in terms of what we have already covered in the 340 course, augmented by such general computing knowledge as can reasonably be expected of a stage 3 Computer Science student; dissertations on topics not yet treated in the course are not required and will not receive any marks.

I try to give all the specific information you need to answer the questions, but don't always succeed. If you consider that you have insufficient information to answer a question, don't ask a question in the test : explain your difficulty in your written answer, say what further information you would need to resolve it, and make clear any assumptions that you have made.

QUESTION 1.

Operating systems as we now know them have evolved from small beginnings. The aim throughout the evolutionary process has always been in some sense to increase the efficiency of the system. One of the characteristics of the evolution of monitors to operating systems was an increase in paranoia : the monitor system provided a "kit of parts" for driving all the machinery and left programmers to use them as they wished, while an operating system typically does not permit any ordinary programmer direct access to any sensitive system function.

- * (a) Explain why the operating systems are more secretive. List some reasons which you think are important, and show how each has contributed to the observed change in attitude.
- * (b) As processors, and other computing machinery, become cheaper, patterns of work change - typically, r to part (a) still apply to possible new ways of working ? Discuss them one by one. Bear in mind that people will still want to do the same sorts of data processing that they do now, though they may want to do other things as well.

QUESTION 2.

The file `plus` contain a shell script; a listing of the file appears below.

- * (a) State in no more than one line what the script does.
- ** (b) Explain how it works, noting in particular any features which you think are particularly desirable or undesirable.

```

:      # PLUS #

if test $1 = +
then
    echo Found a + sign.
else
    echo Didn\'t find a + sign.
fi

```

- *** (c) A transcript of a short session using `plus` is shown below. Give a brief explanation for the behaviour

```

% plus
test: a: not found
Didn't find a + sign.
% plus +
test: a: not found
Didn't find a + sign.
% plus A
test: a: not found
Didn't find a + sign.
% rm test
% plus
test: argument expected
Didn't find a + sign.
% plus +
Found a + sign.
% plus A
Didn't find a + sign.
%

```

QUESTION 3.

List some facilities (sometimes called "abstractions") which the surrounding system should provide if a protection and security system based on passwords is to be constructed, and say what additional facilities would be needed to construct a system based on capabilities. For each facility you mention, comment on the ease with which it can be added on to an existing operating system by software changes if not designed in from the beginning.

Alan Creak,
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