+1/1/60+

Computing Infrastructure

Student id (codice persona):

.....

Last Name / Cognome:

.....

First Name / Nome:

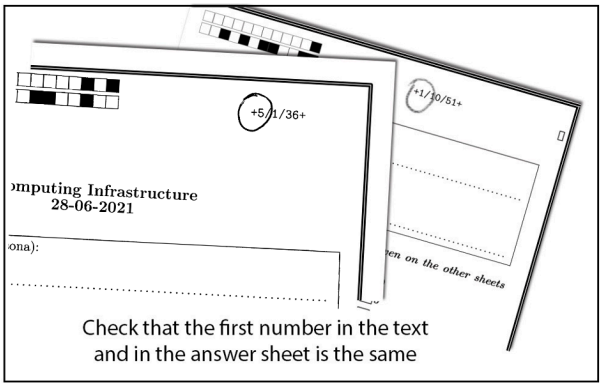
.....

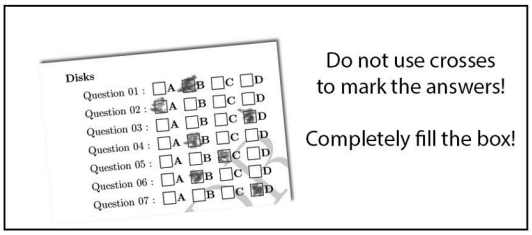
Answers must be given exclusively on the separate answer sheet (last sheet): ANY BOX FILLED IN THIS TEXT WILL BE IGNORED

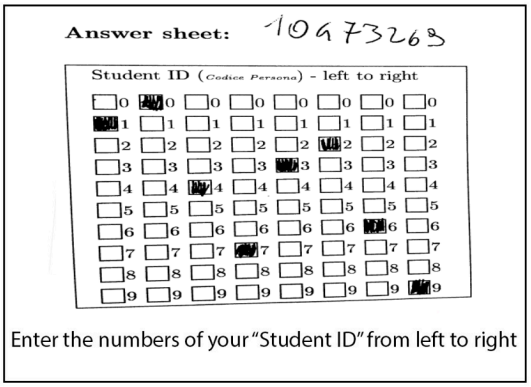
Students must use pen (black or blue) to mark answers (no pencil).

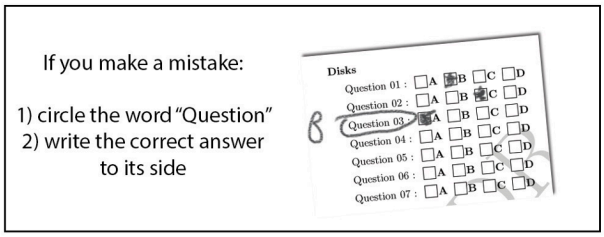
Students are NOT permitted to use mobile phones and similar connected devices.

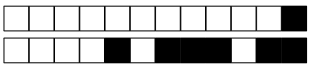
Scores: correct answers take positive points, unanswered questions take 0 points, **wrong answers take negative points** (keep this in mind before selecting a random choice). An indication of the points is available at the beginning of each section. The final score will be remodulated at the end of the evaluation.











Techonologies I - multiple choice questions

Correct answer: +2, No answer: 0, Wrong Answer -0.666

Question 1
In the Microkernel architecture of VMs:

- [A] Drivers are part of the Guest VMs
- [B] Drivers are part of the Hypervisor
- [C] Drivers are part of a specific service VM
- [D] Drivers are part of the Guest OS

Question 2
Which statement about Paravirtualization is correct?

- [A] It is the same of Kernel-level Virtualization
- [B] Guest OS and VMM are independent each other
- [C] It cannot be used with traditional Operating Systems
- [D] Hooks are not required

Question 3
Which is the goal of the "machine-learning software as a service"?

- [A] Provide networking paradigms for machine learning
- [B] Provide ready-to-use machine learning applications
- [C] Provide platform and toolboxes for machine learning
- [D] Provide hardware infrastructures for machine learning

Question 4
An emulator:

- [A] emulates only the ISA but not the ABI
- [B] emulates only the ABI and not the ISA
- [C] reproduces the machine by providing not only ABI but ISA (user/system)
- [D] supports the Java Runtime Environment

Techonologies II - true false questions

Correct answer: +1, No answer: 0, Wrong Answer -1

Question 5 Does an emulator read, interpret and execute all the bytes included in the memory of system it is going to reproduce?:

A True B False

Question 6 The program in warehouse-scale computing may consist of tens or more individual programs:

A False B True

Question 7 Data centers are buildings where multiple servers and communication units are co-located

A False B True

Question 8 What is a computing infrastructure?

A Technological infrastructure that provides hardware and software for computation to other systems and services

B Technological infrastructure that provides applications to other systems and services

Question 9 Tower servers consumes less space than rack and blade:

A True B False

Question 10 Blade servers require expensive configurations:

A False B True

Question 11 TOR switch refers to:

A Tower switch

B Top-of-rack switch

Question 12 Racks shelves may contain switches:

A True B False

Methods - multiple choice questions

Correct answer: +2, No answer: 0, Wrong Answer -0.5

Question 13 Considering the following RAID 5 setup with N disks, each one with a MTTF equal to 1200 days and a MTTR equal to 10 days. The minimum MTTDL of the storage infrastructure is 5 years, What is the maximum number N of disks that can be included.

A 4 disks
B 5 disks
C 6 disks
D 2 disks
E None of the others

Question 14 A Raid5 system uses four 2TB disks to store data and the required parity bits. Considering that each disk has a Random Access Speed (Throughput) of 120MB/s, what is the expected throughput of the RAID-5 considering a RANDOM-READ pattern?

A None of the others
B 120 MB/s
C 60 MB/s
D 480 MB/s
E 360 MB/s

Question 15 Consider a HDD with, 4KB as block size, 10000 RPM as rotation speed, 0.2 ms as transfer time of 1 block, and a negligible overhead of the controller. Knowing that the average I/O time for accessing a file of 800KB is 1.228 sec, and the average locality is 40%, what is the average seek time for the disk?

A Between 3 and 4.49ms (extremes are included)
B Between 4.5 and 5.99 (extremes are included)
C Less than 3ms
D Between 6 and 7 (extremes are included)
E Greater than 7ms

Question 16 Given a system composed of N redundant modules, what is the minimum value of N to use if I want to have a system availability of at least 0.98 considering that each component has an availability of 0.7?

A N=4
B N<3
C N=3
D It is not possible
E N>4

Question 17 A server manufacturer designed a system with a MTTF = 14Years. How long it should be the maximum warranty considering that they want to receive back during this period less than 10% of the devices. Choose one of the following options for the value of the maximum warranty W that is the maximum value satisfying the request. Consider that you have to select the interval that includes the value W (maximum possible warranty) not the valid warranty interval, e.g. if W=9.8 then 9<W<12 is the CORRECT answer.

A 12months<W<=15months
B 9months<W<=12months
C W<=6months
D >15months
E 6months<W<=9months

Performance Evaluation

Correct answer: +2, No answer: 0, Wrong Answer -0.666

A network adapter has been monitored for $T = 600$ s. In this time $C = 12000$ packtes have been sent, and the channel has been busy $B = 540$ s. The average response time of the packets is $R = 100$ ms.

Question 18 The *Average service time of the adapter* is:

A 50 ms
B 45 ms
C 0.045 ms
D None of the others

Question 19 The *average number of packets* in the system are:

A 2
B 20000
C 2.222
D None of the others

Next, consider a DBMS working on a CPU and two disks with the following demands: $D_{CPU} = 30$ ms, $D_{disk1} = 10$ ms, $D_{disk2} = 35$ ms. It is being used by $N = 10$ users, characterized by a think time $Z = 0.1$ s.

Question 20 The maximum thorughput of the system is:

A 28.57 j/s
B 11.76 j/s
C 57.14 j/s
D None of the others

Open question

Correct answer: + 4 Write in the box below, answers outside the delimited area will not be considered.

Question 21 Describe the main differences between type 1 and type 2 hypervisors.