Prénom …………………………….

Nom …………………………………

Promotion …………………………..

Groupe …………………………….

**Promotion L3 INT**

**Module Computer Architecture**

**Code cours TI6 06I-DE**

**DE - 1h45 min**

**19/05/2020    13H00 – 14H345**

Sujet proposé par :  **DAMESTOY Jean-Paul**

Calculatrice autorisée :  ☒ **OUI**                    ☐ **NON**

Documents autorisés : ☒ **OUI**              ☐ **NON**        **Type de documents : tous types**

Ordinateur portable autorisé : ☒ **OUI**              ☐ **NON**

Internet : ☒ **OUI**                    ☐ **NON**

Traducteur électronique, dictionnaire : ☒ **OUI**              ☐ **NON**

**Consigne :**

Merci de restituer uniquement : **your work (exercises 2 and 3) in word or pdf format on Moodle**

**Rappel :**

- Tous les appareils électroniques (téléphones portables, ordinateurs, tablettes, montres connectées …) doivent être éteints et rangés.
- Il est interdit de communiquer.
- Toute fraude ou tentative de fraude fera l'objet d'un rapport de la part du surveillant et sera sanctionnée par la note zéro, assortie d'une convocation devant le conseil de discipline. Aucune contestation ne sera possible. Tous les documents et supports utilisés frauduleusement devront être remis au surveillant.
- Aucune sortie de la salle d'examen ne sera autorisée avant la moitié de la durée de l'épreuve.

This document contains 3 exercises:
- Exercise 1 is in the form of MCQ to be done on Moodle directly (20 questions over 30 mn)
- Exercise 2 focuses on the Little-endian and Big-Endian data storage standards.
- Exercise 3 deals with the management of I/O requests.

## Exercise 1: course quiz (10 points: 0.5 point per question)

To be done directly on the Exam section on Moodle (DE 19 May 2020 - Quiz part)

## Exercise 2: little-endian and big-endian standards (5 points)

Consider two computers with 32-bit memory words. One adopts the big-endian representation, the other the little-endian representation.

1.  Remind the organization of bytes in a memory word with each of these two representations.
2.  It is assumed that these machines store the following information for a database record:
    *   Name: « Luc Duval », which is a string of characters, with each character occupying one byte in memory,
    *   Age: 31, which is an integer stored in a memory word,
    *   Service number: 260, which is also an integer (for info 260 = 1 x 256 + 4) stored in a memory word.

    Give the memory representations of these data for each of the two machines (for info, 20 bytes, i.e. 5 memory words, are necessary).

3.  A transfer of this data from the big-endian machine to the little-endian machine is carried out. If this transfer is carried out byte by byte (from byte 0 to byte 19), how are the values received by the little-endian machine interpreted?

**Exercise 3**: interrogation and interruption input/output modes (5 points)

An input/output device makes 10 requests per second, each of which requires 5 000 processor instructions to be processed.

1. Input/output is by interruption. It takes a thousand processor instructions to save the context and start the request processing manager, and another thousand processor instructions to load the context and return to the main process. How many instructions per second does it take to manage I/O?

2. Input/output is now done by interrogation. The processor takes advantage of a pre-existing periodic interruption every hundredth of a second to scan the device and see if there is a request to process. There is therefore no additional cost for context switching. Each query requires five hundred processor instructions, in addition to processing the request if it is present. How many instructions per second does it take to manage I/O?