REPEAT STRUCTURE

PROGRAMMING AND INFORMATION SYSTEMS - 1 ° The NO
GPSI TECHNICAL PROFESSIONAL COURSE

"I think ninety-nine times and find nothing; I leave
think, I dive into a deep silence – and behold the
truth is revealed to me."

(Albert Einstein)

Module 02

Execution Control Mechanisms

Introduction

It is often necessary to repeat, a certain number of times, a certain instruction or instruction set.

It is often necessary to maintain an indeterminate number of times a cycle ("Loop") of repetitions, as long as a certain condition is verified.

This repetition, most of the time, does not have to be an exact repetition of the same operations, as there may be certain data (variables) or parameters that go through changing as the cycle progresses.

Example of repeating structures:

the *for*

the *while*

While in a "for" structure, the number of times the cycle will be repeated
is determined at the outset by a control variable that is incremented or decremented by the
as the cycle progresses. In the " *while* " structure, the cycle will run an undetermined number of
sometimes depending on whether or not the control condition is checked - which depends on the
events during the cycle itself.

Page 2

Activity proposal

1. The Navarros decided to build a Kartodromo to have fun when they don't have tests to
   do. Each race consists of 5 laps. To find out how long each pilot takes to
   to take the test it is necessary to record the times of each lap. Your mission is to create the program
   that allows you to read the times when passing the finish line and at the end of 5 laps it shows on the Box screen the
   total time spent.

2. Make an algorithm to calculate a value A raised to an exponent B (A^B). The values A and
   B should be read. Do not use the A^B arithmetic operation.

3. The school's heating system checks temperatures every hour of operation.
   The direction needs to know the thermal amplitude for the class period (from 9 am to 5 pm) to
   realize what temperature should adjust for classrooms. as the Navarros like to
   schedule in a comfortable way, let's help the school administration. For that you must
   develop a program that after reading the hourly temperatures can indicate the
   minimum and maximum temperature and corresponding thermal amplitude.

4. An air carrier has an airplane that can carry 1000 kg of cargo in the hold.
   On each trip, the company charges a fee of €20 for each suitcase that you carry. as the
   cargo weight cannot exceed 1000 kg, it is necessary to know in the Check In process o
   weight of each suitcase. In this exercise you should prepare a program that reads the weight of the bags of
   successively and when the load limit is reached, it must indicate that the limit has been reached
   allowed, then showing the amount calculated in rates.

5. The elections for the student association are approaching. The traditional process of choosing
   of candidates is based on the piece of paper placed in the ballot box. This process stops
   in addition to being time-consuming (especially in the counting of ballot papers), it is subject to reading errors.
   This year, Navarros will prepare an innovative solution. Your mission is to create a
   program on the computer console that successively asks for the letter of the list in which the student
   want to vote. At the end of the voting period (which will be when the presiding officer loads
   in the letter '0') the program must present the results, ie the total number of votes that
   every list managed to get.

6. The school wants to know which is the best student in each class. For that, it intends to hire a
   program that reading the average of each student can indicate in each class what the number of
   best student. The program should ask how many students the class has; then you must read the

classification of all students and at the end show the number of the best student.

- 2 -

academic year **2021/2022**

Page 3

7. Construct the algorithm from the factorial of a number, that is, the product of all integers since 1 to the chosen number. For example, the factorial of 3 is 1 x 2 x 3 = 6, but the factorial of zero is 1. Use the "To..." structure, but don't forget to pay attention to the factorial detail from zero to be 1.

8. A prime number is a natural number with exactly two divisors, 1 and itself. Prime numbers are important due to the many practical applications they have in the world. of computing. Design an application that determines whether a natural number is prime or not.

9. Imagine you are a biologist who works in a large laboratory. During the last month has accompanied by the growth of a culture of your favorite bacterium, Fortranicus Bacillus. You are particularly interested in how it grows in hostile environments. Today it's the last day of your experience. In advance, remove your logbook and put it in on the counter, but his enthusiasm is such that he ends up hitting a bottle of acid that spills onto the countertop, dissolving your work while you look desperate. You desperately try to recover some statistics. With how many bacteria individual started the experience? He doesn't even remember how many days it has been going on. In despair calls his Assistant. "No, I don't remember how many bacteria it started with the experience," she says. "But I remember it was an odd number. Oh yes, the number of bacteria doubled every day". He looks at the bench, sniffs the acid and walks back to his table with a wrinkled nose. Even though you lost your grades, you can still count the total number of bacteria you have now. Combining this with the assistant's information, you must write a program to answer the initial two questions. ie you must calculate (i) the number of bacteria with which the experiment began, and (ii) the duration of the experience.
Determine the number of bacteria at the start of the experiment and the duration of the experiment, knowing the total number of bacteria at the end of the experiment.

10. Have you ever heard the expression "Money makes Money"? And it's not that it's true. the banks offer savings products that allow us to monetize our money. the deposits term allow us to capitalize our investment, that is, at the end of each year they add to the money deposited at the contracted interest rate as permanence bonus. In this exercise let's try to make an investment simulator for time deposits. So through the introduction of the amount, number of years and annual net interest rate (TANL) the program must indicate what is the amount received at the end of each year. Ex:

- 3 -

academic year **2021/2022**

Page 4

Input Data
Amount: 10000
No. Years: 3
TANB: 3%

Output Data:
1st Year: 10300
2nd Year: 10609
3rd Year: 10927
Interest Earned: 927

11. The parity of an integer n is defined as the sum of its bits in binary representation.

As an example, the number 20 = 10100 has two 1s in its binary representation, and therefore

it has parity 2. The following figure shows an example of converting decimal to

binary.

Conversion from decimal to binary

In this problem you should calculate the parity of an integer given by the user.

GOOD WORK! YOU ARE ABLE! BUILD YOUR KNOWLEDGE...

The subject teachers,

Andreia Backyard | Carlos Almeida

- **4** -

academic year **2021/2022**