CSIS104: Introduction to Computer Science

Lecture 1:
Administrative Stuff
Computational Thinking

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Slides are based on: Prof. Dr. Slim Abdennadher's slides

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Overview:
Contents and objectives

- What is CSIS 104?
  - Introduction to Computer Science principles
  - A course with no prerequisites:
    - no background in computer science needed
- What isn't CSIS 104?
  - A Computer literacy course
  - A programming course

Main Objective:
Computational Thinking

What is Computational Thinking?

- Computational thinking involves:
  - Solving problems
  - Designing systems
  - Understanding human behavior by drawing on the concepts fundamental to computer science
  - It includes a range of mental tools that reflect the breadth of the field of computer science

What are the elements of Computational Thinking?

- Logical Thinking
- Algorithmic Thinking
- Efficient Solutions
- Scientific Thinking
- Innovative Thinking

Organization of the Course

- Lectures: once a week
- Labs: once a week. You have to attend!
- Evaluation: Grade is based on
  - a midterm exam
  - a final exam
  - quizzes
  - assignment

Tentative grading

- The tentative overall weighting for your grade:
  - Assignment: 10%
  - Quizzes: 25%
  - Mid-Term Exam: 25%
  - Final Exam: 40%

Survival guide

- Tell me and I will forget;
- show me and I may remember;
- involve me and I will understand.

- Keep up with the course material
  - Attend lectures and labs
  - Participate in the discussions (be active)
  - Solve the assignments and understand the model answers provided

- WWW-page
  - Visit course home page regularly for announcements and supplemental material
    - http://met.guc.edu.eg/Courses/CourseEdition.aspx?crsEdId=781

Survival guide:

Do not copy !!!

Algorithmic Thinking

- Consider the following problem: We want to wash our hair twice.
- Algorithm
  - 1 Wet your hair
  - 2 Lather your hair
  - 3 Rinse your hair
  - 4 Lather your hair
  - 5 Rinse your hair
  - 6 Stop, you have finished shampooing your hair
- Informally:
  - An algorithm is a step by step method for solving a problem

Algorithms

- Algorithms are not necessarily limited to simple tasks.
- We use algorithms all the time in our daily life, for example:
  - Cooking recipes
  - Directions how to get to places
  - Performing mathematical tasks such as:
    - Calculate the students' GPA
    - Calculate the interests for invested money in a bank
    - . . .

An algorithm for calculating the area of a square

- Step 1. Get the value of Side
- Step 2. Area = Side x Side
- Step 3. print the value of Area

Why is this important?

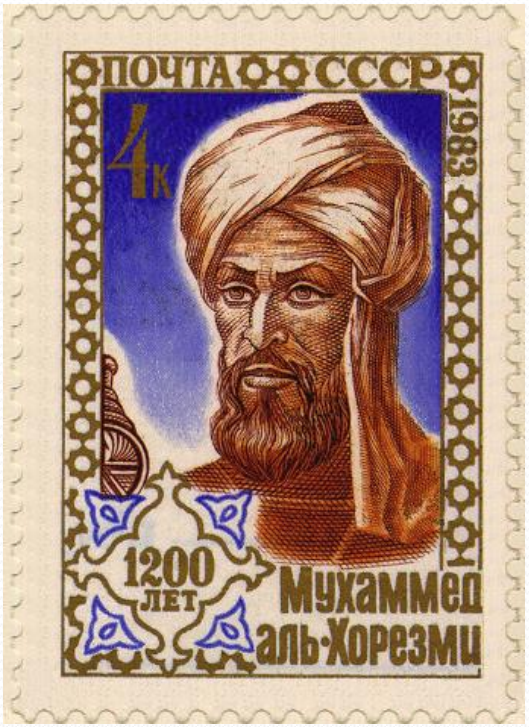
- If we can specify an algorithm to solve a problem, then we can automate its solution.
- Definition (Computing agent)
  - A computing agent is an entity capable of performing the steps described in the algorithm, that is, execute the algorithm
  - This could be:
    - a person
    - a robot
    - a living cell (of an organism or a bacteria)
    - a computer
    - In our case, typically a computer.

Why use a computer?

- **Computers are fast:** they can perform operations without errors at speed unattainable by human beings.
- **They can store very large amount of information:** Human beings have a difficulty managing and keeping track of a large number of objects.
- **They are not task specific:** they can be programmed to perform different tasks. Most other tools can do only one thing.
- **Their tasks can be automated:** computers are excellent at performing the same task over and over again on similar pieces of data (i. e., preparing payment bills for every mobile phone user)

Algorithm:
Historic roots

- Named after the Persian mathematician:
  - Muhammad Ibn Musa Al-Khwarismi
  - 780-850 in Khwarism (today Khiva), Usbekistan
- developed a strategy for calculating heritage proportions for rich Arabian with four woman using algebraic methods
- His name was turned into Algorism and that evolved Algorithm



Representing algorithms

- What language to use?
  - Expressive
  - Clear, precise and unambiguous
- For example, we could use:
  - Natural Languages (e. g., English)
  - Formal Programming Languages (e.g. Java, C++, Python)

Contacts

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