A-Level Computer Science Getting Ahead Work

Activity - Python Programming

Python is a programming language which is great for creating fun and interesting computer programs to solve all sorts of problems from games to databases, and statistical analysis systems to quizzes and puzzles.

We use Python as our primary programming language on the A-Level Computer Science course at HSDC Havant Campus. You may have used Python at school. If not, that is no problem, we will have you up to the same level as all the other students very quickly.

To start preparing for your studies in Computer Science at HSDC I would like you to have a go at running and updating to a Noughts and Crosses program.

1. Open this website : https://www.online-python.com
2. Copy the program below and paste it into the main.py window on the website.
3. Run the program and have a game against the computer. Can you beat it :-)
4. The computer plays randomly with no intelligence.
5. Look at the program code and see if you can work out how it works.
6. Have a go at some of the coding challenges below.

Coding Challenges

- Change some of the print commands to see what difference it makes.
- Improve the design of the program, maybe add some lines.
- Allow the user to choose if they are Os or Xs.
- Add some extra intelligence to the moves of the computer.
- Allow the game to be repeated.
- Anything else you can think of :-) have fun with it.

Don't worry if you can't understand some of the code. It will all become very clear when you are studying on our fabulous A-Level Computer Science course.

I look forward to seeing you in September.

The Noughts and Crosses Program

```
# NOUGHT AND CROSSES  DANNY FELLOWS

# THIS IS THE BASIC PROGRAM WITH NO VALIDATION AND NO
# INTELLIGENT PLAY FROM THE COMPUTER.  THE COMPUTER PLAYS
# RANDOMLY.

import random

print("")
print("NOUGHTS AND CROSSES")
print("====================")
print("")

board=[["1","2","3"],["4","5","6"],["7","8","9"]] # SET UP 3x3 LIST

# DISPLAY THE CURRENT BOARD
```

```
for x in range(3):
    for y in range(3):
        print("  ", board[x][y], end = " ")
    print("\n")

winner = "No"
quitGame = False
goes = 0

while not quitGame and winner == "No":

    # HUMAN'S GO

    validMove = False

    while validMove == False and quitGame == False:

        humanMove = int(input("Which square would you like? (0 to quit) : "))

        if humanMove == 0:
            quitGame = True
        else:

            # WORK OUT THE POSITION OF PLAYER'S GO ON THE BOARD

            row = int((humanMove-1) // 3)          # // is integer division

            col = int((humanMove-1) % 3)           # % is modulus (remainder)

            if board[row][col].isnumeric():
                validMove = True
                board[row][col] = "X"
                goes = goes + 1

    if not quitGame :

        # COMPUTER'S GO (IF GOES <5) - RANDOM

        if goes <5:

            validMove = False

            while not validMove:
                row = random.randint(0,2)
                col = random.randint(0,2)
                computerMove = board[row][col]
                if computerMove.isnumeric():
                    validMove = True
                    board[row][col] = "O"

        # CHECK IF THERE IS A WINNER

        # CHECK THE ROWS

        for r in range(3):
            result=""
            for c in range(3):
                result = result + board[r][c]
            if result == "XXX":
                winner = "X"
```

```
            if result == "OOO":
                winner = "O"

        # CHECK THE COLUMNS

        for c in range(3):
            result=""
            for r in range(3):
                result = result + board[r][c]
            if result == "XXX":
                winner = "X"
            if result == "OOO":
                winner = "O"

        # CHECK THE DIAGONALS

        diagonal1 = board[0][0] + board[1][1] + board[2][2]
        diagonal2 = board[0][2] + board[1][1] + board[2][0]

        if diagonal1 == "XXX" or diagonal2 == "XXX":
            winner = "X"
        if diagonal1 == "OOO" or diagonal2 == "OOO":
            winner = "O"

        if winner != "X" and goes<5:
            print("The Computer chooses square : " , computerMove)

        # DISPLAY THE CURRENT BOARD

        print("")
        for x in range(3):
                for y in range(3):
                    print("  ", board[x][y], end = " ")
                print("\n")

        # IF THERE IS A WINNER PRINT WHICH PLAYER HAS WON

        if goes == 5:
            print("It was a Draw")
            winner = "Draw"
        else:
            if winner !="No":
                print("************************")
                print("***", winner, "IS THE WINNER ***")
                print("************************")

print("\nBYE BYE...")
```