

Supercars – sample solution with explanation (Array of Records)

Trinket link: <https://trinket.io/embed/python3/441e7b2077>

Task 1 - Supercars

Create a program that will read in details of 29 Supercars. Your program must make use of an **Array of Records** and be a **modular solution using subprograms**.

Sample Data is here:

SuperCar			
Name	TopSpeed	EngineSize	BHP
BAC Mono	170	2.3	280
Bugatti Veyron	267	8	1200
Chevrolet Corvette	190	6.2	455
Ferrari 458	202	4.5	562



Full data is stored in the SuperCars.csv file.

Your Task

Basic Pseudocode:

Main Steps. (each step should be a subprogram)

1. Read in and store values from SuperCars.csv. Use Array of Records.
2. Find the Supercar with the fastest topSpeed.
3. Count the number of Supercars with a brake horse power (BHP) > 600 inclusive
4. Allow the user to search for a car name and return engine size. Use LAFerrari to test.
5. Display results to screen.

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In: superCars

Out: fastestCar, fastestSpeed

In: superCars, noOfBHP

Out: noOfBHP

In: superCars,

In: fastestCar, fastestSpeed, noOfBHP

```
#Supercars program
#Example solution
#Programmed by Mr A Simpson
#Date: 10/11/2022
# -----

# 1 Read pupil details from file
def readFromFile(superCars):
    counter = 0

    with open("Supercars.csv") as readfile:
        line = readfile.readline().rstrip("\n")
        while line:
            items = line.split(",")
            superCars[counter].name = items[0]
            superCars[counter].topSpeed = int(items[1])
            superCars[counter].engineSize = float(items[2])
            superCars[counter].bhp = int(items[3])

            line = readfile.readline().rstrip("\n")

        counter += 1

# -----
```

```
# 2. Find the Supercar with the fastest topSpeed.
def findMaxCar(superCars, fastestCar, fastestSpeed):
    #initialise local variables
    maximum = 0
    maxPos = 0

    #set first position of list to maximum
    maximum = superCars[0].topSpeed

    #loop through each position from second item
    for counter in range(1, len(superCars)):
        if superCars[counter].topSpeed > maximum:
            maximum = superCars[counter].topSpeed
            maxPos = counter
    fastestCar = superCars[maxPos].name
    fastestSpeed = maximum

    return fastestCar, fastestSpeed
```

```
# -----
# 3 Count the number of Supercars with a brake horse power (BHP) > 600 inclusive
def countOccurrences(superCars, noOfBHP):
    for counter in range(0, len(superCars)):
        if superCars[counter].bhp > 600:
            noOfBHP += 1
    return noOfBHP

# -----
```

```
# 4. Allow the user to search for a car name and return engine size. Use LAFerrari to test.
def linearSearch(superCars):
    found = False
    target = ""

    print("-----Engine Size Checker -----")
    target = input("What car would you like to search for?")
    for counter in range(0, len(superCars)):
        if superCars[counter].name == target:
            found = True
            position = counter

    if found == True:
        print(target, "has an engine size of", superCars[position].engineSize)
    else:
        print("Car was not found")

# -----
```

```
# 5 Display results to Screen
def DisplayResults(fastestCar, fastestSpeed, noOfBHP):
    print("-----")
    print("The fastest car is the ", fastestCar, "with a top speed of", fastestSpeed)
    print("The number of cars over 600 BHP is ", noOfBHP)
```

```
# Main Program

#Create Record Structure and declare variables
from dataclasses import dataclass
@dataclass
class carData:
    name: str = ""
    topSpeed: str = ""
    engineSize: str = ""
    bhp: int = 0

#Create Array of Records
superCars = [carData() for x in range(29)]

fastestCar = ""
fastestSpeed = 0
noOfBHP = 0

#----- Call functions/subprograms and pass parameters -----

# 1. Call funtion to read in and store values from SuperCars.csv
readFromFile(superCars)

# 2. Find the Supercar with the fastest topSpeed.
fastestCar, fastestSpeed = findMaxCar(superCars, fastestCar, fastestSpeed)

# 3. Count the number of Supercars with a brake horse power (BHP) > 600 inclusive
noOfBHP = countOccurrences(superCars, noOfBHP)

# 4. Allow the user to search for a car name and return engine size.
# Use LAFerrari to test (case sensitive)
searchEngine = linearSearch(superCars)

# 5. Display results to screen
DisplayResults(fastestCar, fastestSpeed, noOfBHP)
```

Main Program comes at the end of your code and should be used to declare variables and Call functions/subprograms.

Variables that are needed throughout the whole program should be declared here and passed into functions/subprograms when required.

Variables that are only needed inside one specific function/subprogram can be declared locally e.g. maxPos

Supercars – sample solution with explanation (Parallel Arrays)

Trinket link: <https://trinket.io/embed/python3/d3ba1d3200>

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In: name, topSpeed, engineSize, bhp
Out: fastestCar, fastestSpeed

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In: name, topSpeed, engineSize, bhp
Out: fastestCar, fastestSpeed

```
#Supercars program
#Example solution using Parallel Arrays
#Programmed by Mr A Simpson
#Date: 10/11/2022
# -----

# 3 Read pupil details from file
def readFromFile(name,topSpeed,engineSize,bhp):
    counter = 0

    with open("Supercars.csv") as readfile:
        line = readfile.readline().rstrip("\n")
        while line:
            items = line.split(",")
            name[counter]= items[0]
            topSpeed[counter] = int(items[1])
            engineSize[counter] = float(items[2])
            bhp[counter] = int(items[3])

            line = readfile.readline().rstrip("\n")

        counter += 1
```

```
# 2. Find the Supercar with the fastest topSpeed.
def findMaxCar(name,topSpeed,fastestCar, fastestSpeed):
    #initialise local variables
    maximum = 0
    maxPos = 0

    #set first position of list to maximum
    maximum = topSpeed[0]

    #loop through each position from second item
    for counter in range(1, len(name)):
        if topSpeed[counter] > maximum:
            maximum = topSpeed[counter]
            maxPos = counter
    fastestCar = name[maxPos]
    fastestSpeed = maximum

    return fastestCar, fastestSpeed
```

```
# -----
# 3 Count the number of Supercars with a brake horse power (BHP) > 600 inclusive
def countOccurrences(bhp, noOfBHP):
    for counter in range(0, len(bhp)):
        if bhp[counter] > 600:
            noOfBHP += 1
    return noOfBHP
# -----
```

```
# 4. Allow the user to search for a car name and return engine size. Use LAFerrari to test.
def linearSearch(name,engineSize):
    found = False
    target = ""

    print("-----Engine Size Checker -----")
    target = input("What car would you like to search for?")
    for counter in range(0,len(name)):
        if name[counter] == target:
            found = True
            position = counter

    if found == True:
        print(target, "has an engine size of", engineSize[position])
    else:
        print("Car was not found")
# -----
```

```
# 5 Display results to Screen
def DisplayResults(fastestCar, fastestSpeed, noOfBHP):

    print("-----")
    print("The fastest car is the ", fastestCar, "with a top speed of", fastestSpeed)
    print("The number of cars over 600 BHP is ", noOfBHP)
```

```
# -----
# Main Program

#Create Parallel Arrays & declare variables

name= [""]* 29
topSpeed = [0]* 29
engineSize =[0.0]* 29
bhp = [0]* 29

fastestCar = ""
fastestSpeed = 0
noOfBHP = 0

#----- Call functions/subprograms and pass parameters -----

# 1. Call funtion to read in and store values from SuperCars.csv
readFromFile(name,topSpeed,engineSize,bhp)

# 2. Find the Supercar with the fastest topSpeed.
fastestCar,fastestSpeed = findMaxCar(name,topSpeed,fastestCar, fastestSpeed)

# 3. Count the number of Supercars with a brake horse power (BHP) > 600 inclusive
noOfBHP = countOccurrences(bhp, noOfBHP)

# 4. Allow the user to search for a car name and return engine size.
# Use LAFerrari to test (case sensitive)
searchEngine = linearSearch(name,engineSize)

# 5. Display results to screen
DisplayResults(fastestCar, fastestSpeed, noOfBHP)
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Main Program comes at the end of your code and should be used to declare variables and Call functions/subprograms.

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