TUPLES: PYTHON DATA STRUCTURE

Hello guys, welcome to programming screen cast, in this programming screen cast we would be seeing about a data structure that python offers you, please don't get terrified by the term data structure it is nothing it's just way which you can arrange your data. That is what you call as data structure in simple terms so python offers a lot of data structures we had seen some of them in the previous weeks we had seen list you have been extensively using lists and you will be also using in future and dictionaries we had seen you had dictionaries in rock, paper, scissors game i guess so will see yet another data structure call the tuples. So the data structure name is tuple, maybe i guess now you can see it the font size i have increased the data structure name is tuple, we call it as a tuple so what is basically a tuple will see right? so initially we will start with creating a tuple, how can we create a tuple? So let me say i want to store the ice cream flavours which i like let us say ice cream flavours let me say, ice cream flavours equal to it's a name of my tuple that's a variable name so i will say to create a tuple what you need to use is the normal paralysis the normal brackets open and close bracket so within this you need to give the items of the tuple, one maybe i can say vanilla then i can say chocolate then butterscotch then strawberry maybe i will say strawberry and so on you can give any number of flavours so alright so let me press enter alright my tuple got created now if i say ice cream flavours see i got this tuple vanilla, chocolate, butterscotch, strawberry whatever i had added so you can use this way or you can print as how had been using print ice cream flavours i think i was just pressing the tab key because of which it got auto fill and please note that i am using the console i am explain using the console if you feel that the screen doesn't appear familiar just that i have maximised the console that's it i will press enter see i got it as a tuple ok so what if i want to print it one by one, how can i do that? Simple just like how you use loops in lists or dictionaries something like that say something like that you can use loop ok let us see how we can print the elements one by one simple just like how you have some you have used loops in lists or dictionaries previous data structure whatever data structures you had seen you can use a loop to print each element individually as you wish so let me use a for loop for i will say flavours flavour in ice cream flavours that is my variable name start my loop i will say print sorry its print i have to say flavour so i have used an intuitive name you can use any variable name here for i j anything you can use even though this is tuple of ice cream flavours i am using a variable name flavour we got it one by one vanilla, chocolate, butterscotch, strawberry alright so we had printed the elements in the tuple and now in case if you want to access the individual elements how would you do? That is i just want to print chocolate let us say how would you do? Let us see chocolate is the second element in my list just like in my tuple so let just like how i did in my list i will use the index indexing mechanism so let me say print what is this tuple name ice cream flavours of the index i have to give its my second thing so let me give two letters see what happens butterscotch see the third one gets printed so if i say two the third one in the list got printed so what does that mean? So the indexing mechanism the python uses is different so that is it starts counting differently its starts counting from zero just as how it did in list you should start counting from zero this is index zero vanilla is at index zero chocolate is at index one butterscotch is at index two strawberry is at index three this is how it counts we start counting from one and but the computer starts counting from zero so if he want the second item we

should give index one then we can get the second item as per our view, as per our perceptivity second item but for computer first item that is because its start counting form zero so let us print it print ice cream flavours of one so that is the second item actually if i print see i got chocolate which is the second one actually in the list alright so this is how you access an item simple nothing but you give the name of the tuple ice cream flavours you use this square brackets and give the index at which you are decided item is present say let me say three strawberry got printed let me say i will let it be a typo i will say thirty see tuple index out of range it throws an error in case such an item that is index number thirty i have instead of printing three let in case i printed i typed as thirty that a typo error given that there is no index thirty in the list it says index out of range that is there is a range of the index value for this tuple that is zero one two three these are the allowed values this thirty is out of this range is what the error means so it throws an error right so let us see we have let us just summarise very quickly. We had created a tuple ice cream flavours and we had access the individual element to create a tuple what you did? You just used the open parenthesis and you just inserted the item and you had just access the elements so in case i want to change something for example i don't want to have butterscotch instead i would like to add black current flavour so i want to modify the element or i want to add something newly so how would i do that? Let me see let me say tuple name is ice cream flavours just as how you did in lists the update functionality let us try the same way because we are accessing the elements in a similar way as that of the list using indexes so let us try updating as well the same fashion as that in list so let us see ice cream flavours of it was in index two right butterscotch so let me remove that and i want to make it as black current black current clack current i made it as i don't need an underscore here is a string so basically ok black current so let me press enter see its throwing an error tuple object does not support item assignment its telling something ok let me try adding it as new item so it was having zero one two three right i want to add it at index four i will say index four is black current here i am trying to add it initially i tried modifying it was not allowing me for what so ever reasons let me try adding it the same error is being thrown again probably i have to delete that initial value and again reassign the value probably that is how tuples work let me experiment let me say delete the same key word that we used in dictionaries delete del ice cream flavours of two let me say tuple object doesn't support item deletion oh even this doesn't work so let me ask for help delete question mark that will give me a hint delete not found what happened? Omg! Delete ice cream flavours let me check let me ask for help tuple empty the tuple if i ask for a question it says it will empty the tuple it says i cannot delete an individual item i cannot modify an item i cannot add an item i cannot delete and individual item all that i can do is i can delete the tuple completely i can delete the entire tuple so basically tuples are sort of data structures which is fixed once of you fix something it remains as that as like that forever that is what they technically call as immutable so those who have some knowledge of biology you would have heard term called mutation that is nothing but some changes in your genes that is what they call as mutation so the same terminology they have been using here as well we call tuples are immutable because you cannot make changes as like you had made in list or dictionaries if you use a tuples so tuples once if you fix something it is fixed forever now if i say delete ice cream flavours the entire tuple would get deleted so let me check if i now call ice cream flavours and i call it says name 'ice cream flavours' is not defined so what are the options that

is supported is you can create a tuple, you can access the elements of a tuple and you can delete it as a whole you cannot add anything modify anything delete a single item nothing of sort can be done so it is sort of a foxed data structure alright it seems very restrictive right so is there any other option? Is there any other thing that can be done in tuple so let me create a toy tuple for example create a toy tuple let me just use some numbers one two three four given that i have deleted that ice cream flavours tuple so i am just creating another tuple for demonstrating what else can be done so just like the length functionality of the list can be used i will demonstrate length of toy will say four so the length functionality can be used in case i want to see the count i can use the count functionality as well as if you want to retrieve the specific index where the element position is where the particular element is present you can see that toy dot count i want to count the number of times then number two occurs it occurs one time so it says two the toy of count is one let me change the tuple once for you let me making it as one two three four five, one two three four, one two three four five so i had made a new tuple basically see initially i had toy is equal to one two three four and here i have this you can ask me you said tuples are immutable you cannot change them but how can you change this, so what happens is that thing what i had created already this gets destroyed and something new gets created that's what happens so you, if you changing or if you try modifying in this way the old one get destroyed so whatever you once seek that would remain fixed you cannot change it alright so let me show that for you, length of toy initially it was four now if i say it's says nine so the earlier copy was completely destroyed so now i can show you the functionality count toy dot count let me say how many number of times the number two occurs, it occurs two times number four occurs two times number five once so count is the function that is how many number of times this particular item is occurring in the tuple so in a tuple you can give numbers initially in ice cream favour example we gave strings you can give it anything even the floating point value you can give anything we will see some applications where the different types of values are given in tuples so count is one functionality and other functionality you can have is index so let me say toy dot index of five let me say five is present at index eight and if you say, say for example two it is present at index one it says but see two was present at two places so the index functionality returns the very first index from the left where the particular item is present, that is what the index functionality does, so these are some functionality that you can list, length, count index that can be used in tuples also but something you can do in list which cannot do in tuple is you are modifying an element, adding a new element or deleting the particular element those things are not allowed so tuples are sort of once you defined its fixed so such a restricted data structure where can it be used. I had post the question and probably you would have thought the same i guess so why do they even create this? Is it even useful? Of course yes it is used in many cases once such example i wills say, say for example you are dealing with rainbow, rainbow is a tuple you can say the colours in rainbow violet, vibgyor right! Indigo, blue, green, yellow, orange, red so once you have defined this as the rainbow no one can further add or delete or undo anything about this so this is we want to the rainbow consist of these seven colours its fixed so that you don't want anyone to make any changes in such scenario you can make use of tuples, in one scenario where this would be useful this rainbow even is a toy example you can consider as i just showed you to illustrate something that it is fixed in the nature you cannot change no now can change this for such scenario you can use tuples for

one thing where in computer science they use tuples is in you can say in image processing so in images the each individual unit of an image is called as a pixel this is basically like human body contains cells, cell is the basic unit of the human body something like that, the basic unit of the image is called a pixel so each pixel, if you would as you would have studied in your school physics each colour can be represented in terms of the three basic colours namely red green and blue every colour any colour can be represented in terms of this that is by proportions of red green and blue by taking ten percent red forty percent blue and the rest green something like that by some proportions of red green and blue you can denote any colour so every pixel will have a colour in an image so in case if that is a image of a grass or some natural grass the top portion will be the sky it will have the blue value which will have dominant and the bottom portion will be the grass which will have the green value dominant in case you have sand there will be yellow it will be represented in terms of some proportions of red green and blue as you can see every pixel has variation in colours each colour can be represented in proportions of red green and blue so basically a pixel probably would be defined like this pixel one there maybe millions of pixels in an image depends on your camera resolutions where you would have seen that five mp camera, eight mp camera, thirteen mp camera you heard these days right, there may be different pixels it depends on the camera resolution as there are number of pixels increases the clarity of the image also increases so the pixel one contains some colour say yellow colour so it may be something like point seven sorry its zero point seven comma zero point one comma zero point two something like that some proportions of red green and blue rgb is the order in which they will represent the pixels so in that case they internally represent each pixels in terms of tuples so you don’t want to change this that is this should be the proportion in this image you don’t want to change it that time they will say this is the particular pixel configuration that is this is the colour that is associated with this pixel so in such applications in computer science tuples come very handy alright you can think of many such applications where once you fix something you don’t want to change it in such a scenario if you encounter some such scenario you can consider using this data structures tuples alright guys thanks for watching the programming screen cast have a nice day.