SPIRAL TRAVERSING – LET'S ANIMATE 04

Hello every one so in this video we are going to write the program for spiral traversal of the matrix so in the first program i am going to make two programs. In first program will print the matrix in spiral order just what we saw in the last video so will see how we can do this so let's do this, let me create a function name spiral def spiral and what are the parameters of this function? M is the number of rows then n is the number of columns and 'a' is the is my matrix so 'a' is actually a list of list through which i will representing the matrix. Let me define two variables one is k equal to zero and l is equal to zero, let me tell you what these variables are k is actually the starting index of the row which is zero, l is the starting index of the column which is also zero, we know that m is the number of rows in the matrix and n is the number of columns in the matrix so let me write this term, you guys already know that if you want to command multiple lines you have to do with this then you can command multiple lines so let me write this k is index of starting row, l is the index of starting column ok now what we have to do? We have to first print the first row, the first row should be fully printed then we have to shift to the last column and print the all the elements of the last columns so let me write a while loop while see k, k is the index of the starting row, starting row index. Why k is less than l? Means that k is when i am going through all the elements of row so i am exhausting all the rows if i am getting over all the rows then i should not print anything because my rows are over so k should be less than m and l should be less than n, what do i mean? L is the starting column index so all the columns are exhausted so when all my rows and end all my columns are exhausted i have to stop the loop, ok while k is less than m and l is less than n first i have to do is since i am starting first i have to do i have to print all the elements of first row so that let me write a loop, for i in range see elements of first row ok i have to exhaust all the elements through all the columns so i have to go through first column index, second column index keeping my row fixed i have to go through the first column second column third column fourth column and so on so my row index is fixed at a just traverse to the column so i will so my range will be l to n to keep this in mind that this n is whenever we type range, range starts from suppose you write in the parameter you give in range is zero comma five so it will go like zero one two three four not up to five ok so hence i am writing n because n is my number of elements number of columns ok so suppose if i give four it will go to an l is zero so it will zero one two three four times but it will not go up to four as four so i can safely write here n ok inside this loop i will print my elements which are print 'a' see my row is fixed ok i will just write k here because the first k index of first row and i so i have to print i have to traverse row all of the columns so i is the column index so row is fixed row is zero and i will print all the elements so the first row. You all know that if i have to print the elements in one line with this space i have to do like this and with apostrophe inverted comma sorry awesome after this when the first row is over i have to go to the second row i have to see i have to go to the second row when the first row is over one two three four i have to go to the second row so second row is important so now here see second row second row but i have to print the elements of last columns eight, twelve, sixteen so in this traversal the my column is fixed where i have to traverse through all the remaining

rows see remaining rows are second row, third row and fourth row but the column is fixed column is the last column so i will do this see this before so that we don't forget here let me command this commanding is the best practice ever you guys should command every time whenever you write a code so that you revisit you can understand what you wrote anyone who is trying to understand your program or trying to reinvent your program or use your program can understand what you did so it's better to command so let me write here what we did? We print the first row so printing the first row from the reaming rows after this is over when my elements of first row are printed first ok i have to go to the second row so i will do k plus is equal to one which means that now i am on the second row those row index has been increase k is my row index started from zero but now it is of first i mean second row k is equal to one now i have to print the elements of last column now here i have to traverse route the remaining rows ok and my column should be fixed so let me write this for i in range my column is fixed you should remember so i have to traverse through the rows so which is k to m which is because i have already incremented my k so it will go to the remaining k the last row m is the last row index because m is the number of rows. I will just print here print 'a' i have to traverse through row so 'i' column is fixed which is bought n minus one now why here n minus one because again i have to say this because is the number of columns so suppose my number of columns are four since every time list starts from zero so here it should be suppose number of columns are four number of rows are also four i have to put two in order to be in the last column i have to put three here because arrays list always starts from zero so three array i have to put for that i ma putting n minus one here i put k only because k is already zero so i don't have to take care of minus one here but here i have to take care, again i will write end is equal to grid and my last column is over last column is over means i have to shift my columns to the second last what do i mean by the second last? Since now here n is pointing at let's say if number of rows and number of columns are four, four n was pointing at four so n minus one was three now i have to shift to the last column so second last column so that for that i have to do n minus equal to one let me again command this line printing the last column form the remaining column awesome! This is done now here is some tricky part let's see this now we are on the last second last column a last row second last column so we did this now we have to print this ok see the tricky part here is we have to print it in the reverse order, this is the reverse order sixteen after that fifteen, fourteen, thirteen you have to go in the reverse order for that what will you do, if you have to check the number of rows are not exceeding the row index is not exceeding the number of rows why i am doing it again here see i already checked it in the while loop but it might happen that after this condition the k might become that's a five we should not open here we should not escape the five comes here and not stating this condition that there is a bugging the program so for that i have to put the condition again inside this if it is fine then i will write for i in range ok now what i have to do, i have to start from the second last column i already decremented my n by minus one so i am already on the second last column since n is the number of columns i will start from n minus one where i have to go i have to go to the first column, first column is index at zero now it might happen that since we are doing a generalised program it might occur it might not go to the zero it may for example in this part when i am printing eleven and ten i have to go to ten only i don't have to go to nine after that ten eleven after that ten ok so i have to go i have to go to the last starting column index, starting column index for now it is

zero ok for now it is zero but it may not be zero after some time so for that i will write n minus one because again the range, range doesn't go to the doesn't include this value, it doesn't include this value but i need this value for that i need l minus one so that i can go to l is at l since i am going in the reverse direction i am decrementing n minus one, n minus two, n minus three, n minus four up to l i have to go i have to write here that's minus one minus one is my step so by default step is always one positive one so you always go one two three four five suppose you want to go five to one, five four three two one you have to write here you will start form five and up to zero if you want to go up to one n minus one so let me five four three two one this is my step function ok so i will go up to l minus one and inside i will just print my array 'a' n minus one row, row minus one and will start last row because i am in the last row an n minus one because m is the number of rows hence you play that's it. Great! I am done with the last row ok so i will decrement my rows ok because now i am on the last row i want to go to the second last row so i am here i was here printed all the elements of this row i have to go to the second last row i have to decrement my row index not row index i mean number of rows which is m minus one this is done now next is again let me command this line so that i don't it printing the last row from remaining rows ok now what is left? I am on the second last row, i have to print the elements in the second last row i have to print ok second last row i have to print the elements of the first column in reverse order again ok we have to do this in the reverse order again so for that again i have to check if l is less than n ok if l is less than n then inside this i will write loop for i in range m minus one because is already decremented here and i want to start from the second last row second last row to where the first row i have to go until first row so k minus one ok because i have to go until k, whatever k is so for now k is one thing of the second row because we printed the elements of first row here and we incremented our k to the second row i want to go to the up till second row so that's why i am writing k minus one here ok and again step function is minus one because i have to decrement ok and here i will write print 'a' i of l that's it awesome this is done i will just increment my l here because again let me tell you l is the l was the starting column index so after i printed this first column all the elements of first column i have to go to the second column once i printed this i have to go to the second column and again do the same thing which i did here i have to do the this thing again here and next thing here and next thing here next thing here nothing is there sorry so this loop will take care of it ok that's why you wrote this loop let me command this again printing the first column from the remaining column awesome! This is done our program is ready printed everything now let me create my array so let's array is 'a' ok for i in range how many rows i want? I want four rows for j in range ok for columns let me create a index list here l it's an for now let me i write the elements like one two three four five six seven eight nine ten up to sixteen so i will take the count variable and put it one and here i will just append the count variable and increment it ok so i have the elements so j will take care of a rows and the elements of four first row let's say after the first loop of the after the first loop j is over and i append that the list l whatever i got after this loop in the in the in my array 'a' in my matrix 'a' so 'a' dot append l that's it my 'a' is over i have my 'a' and i will call the functions spiral, number of lets say rows are four number of columns are four 'a' now let's see this ok let's see sorry cool i got my spiral traversal one two three four then eight twelve sixteen fifteen fourteen thirteen nine five six seven eleven ten it is? Yeah. One two three four eight twelve sixteen fourteen thirteen nine

five six seven eleven ten cool so this is over you can check this you can write in a different way this is one of the way of writing this program the spiral traversal you can write in a different way also you can create your own logic there is another way which is known as recursion but not we are we will not cover this because it might get little bit complicated but it is cool, you may check depths how we can write a recursive program to print the elements in spiral order so see this and we are going to use this logic spiral traversal in our main program which is creating the pattern.