COLLATZ CONJECTURE

So now you people have seen may questions many answers a lot of programming and now i am going to teach you one of the smallest programs ever taught to you in this course but one of the most complicated of all course in fact the world still doesn't have an answer for this two line code it's a smile while condition and a if condition that's it. You will see that the code gets done in less than quarter page but the world still doesn't know an answer to it. So what's the question? The question is very simple, input any number n if the number n is even make it into half if the number is ten make it five ok if it's even that is, if it's even make it by two if it's odd let say if it was eleven if it's odd shoot that number up by three and plus one which is if an its eleven make it three into eleven thirty three plus one thirty four simple if it's even reduce it by half, if it's odd increase it by three times the number and add one to it that is the way we start with n equals seven so seven becomes into three twenty one plus one twenty two, twenty two is a is an even number so you should half it so twenty two becomes eleven, eleven becomes think about it into three plus one thirty four i will be slightly fast now, thirty four becomes seventeen why? You are halving it ok seventeen becomes three n plus one three times seventeen fifty one plus one fifty two, fifty two becomes twenty six twenty six becomes thirteen, thirteen becomes thirty nine plus one forty, forty becomes twenty, twenty is even it becomes ten, ten is even becomes five, five is odd becomes sixteen, sixteen becomes eight and then eight becomes four, four becomes two, two is even so half of that is one, one is odd so into three plus one is four again we saw four already so whenever you get four it becomes two, two becomes one and one again becomes four you see this is an infinite loop so what we do is we say while the number is greater than one you do this, do what? If the number is even make it become half the number is odd make it become three times that number plus one so seven had how many numbers? Count one two three four five six seven eight nine ten eleven twelve thirteen fourteen fifteen sixteen seventeen eighteen nineteen twenty steps right seven to twenty steps let us take some number big number like two fifty six how many steps it will take let us count. Two fifty six is even half of that is one twenty eight, one twenty eight is even half of that is sixty four even again thirty two even again sixteen wow even once again eight even again four even again two and that then becomes one, one is odd so one becomes four into three plus one four and four becomes two and two becomes one and you enter you stop here you see a small number like seven took a such a long number of steps a number of two fifty six how many steps did it take? Let me count one two three four five six seven eight nine steps as supposed to more than fifteen steps for seven correct so smaller the umber doesn't mean smaller steps, bigger the number doesn't mean bigger steps in fact this piece of code is so not understood given an n when will it stop? We still don't know right this is famously called the three n plus one problem Google for it there is a lot of references for this three n plus one problem also called the Collatz conjecture in fact we don't even know whether this will ever stop for some input it might keep going on and on it may never hit four two one four two one in both the cases you saw it four two one but it needed four two one you see Google for it read lot about it and know when someone comes and gives you long program and says he has done something very complicated give that person simple code like this and ask him to analyse what is happening that will be a big goggle for him will not really converge to a nice answer on what exactly happening here ok that was fun looking at

question that is smallest possessive we have given you very very very big programs that work and very very small program like this that even the world doesn't know how to answer so programming world is very huge very interesting very fascinating sky is the limit i hope you people have enjoyed the lectures given to you so for so we are ending this course with a quick code on collatz conjecture.