In June 2018, I asked to a group of 18,738 students,

"Why do some students find programming in C, so difficult?"

The first answer was,

"It involves thinking. We have been programmed by our respective school boards not to think."

Also known as CS101, Introduction to Programming, Computer Programming, Computational Thinking, and Programming in C

Computer Programming in C

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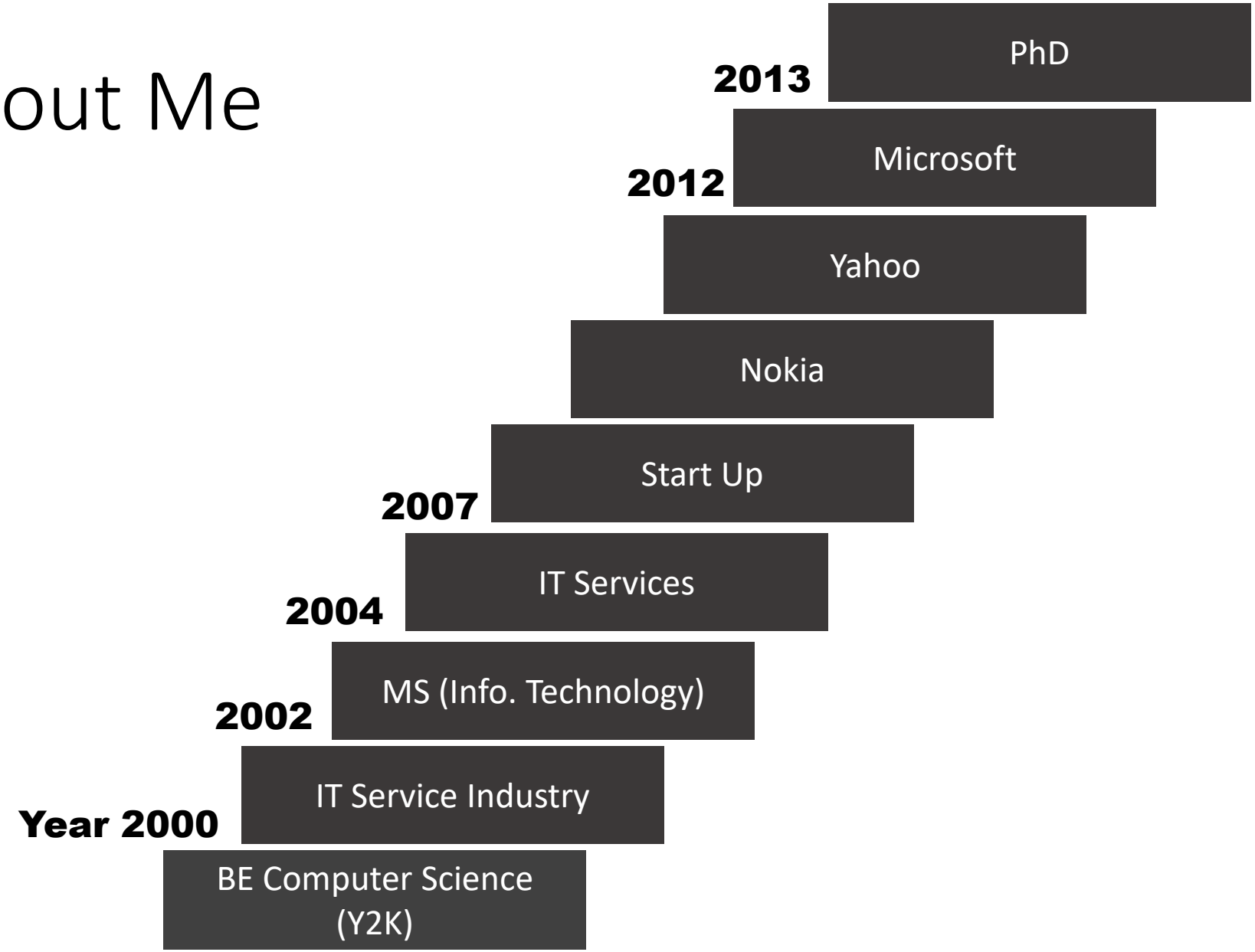
You Can Call Me

- Venkatesh
- Venky
- Venkat
- Vv
- ~~Sir~~

Mails addressing me as ‘sir’ may not get a response

About Me


2013
PhD
2012
Microsoft
Yahoo
Nokia
2007
Start Up
2004
IT Services
2002
MS (Info. Technology)
Year 2000
IT Service Industry
BE Computer Science
(Y2K)

Agenda

- About the Course
  - Know the Course
  - Know Your Instructor
- Your First C Program
  - Hello World!
  - Editing, Compiling and Executing the Program
- More C Programs
- Computational Thinking

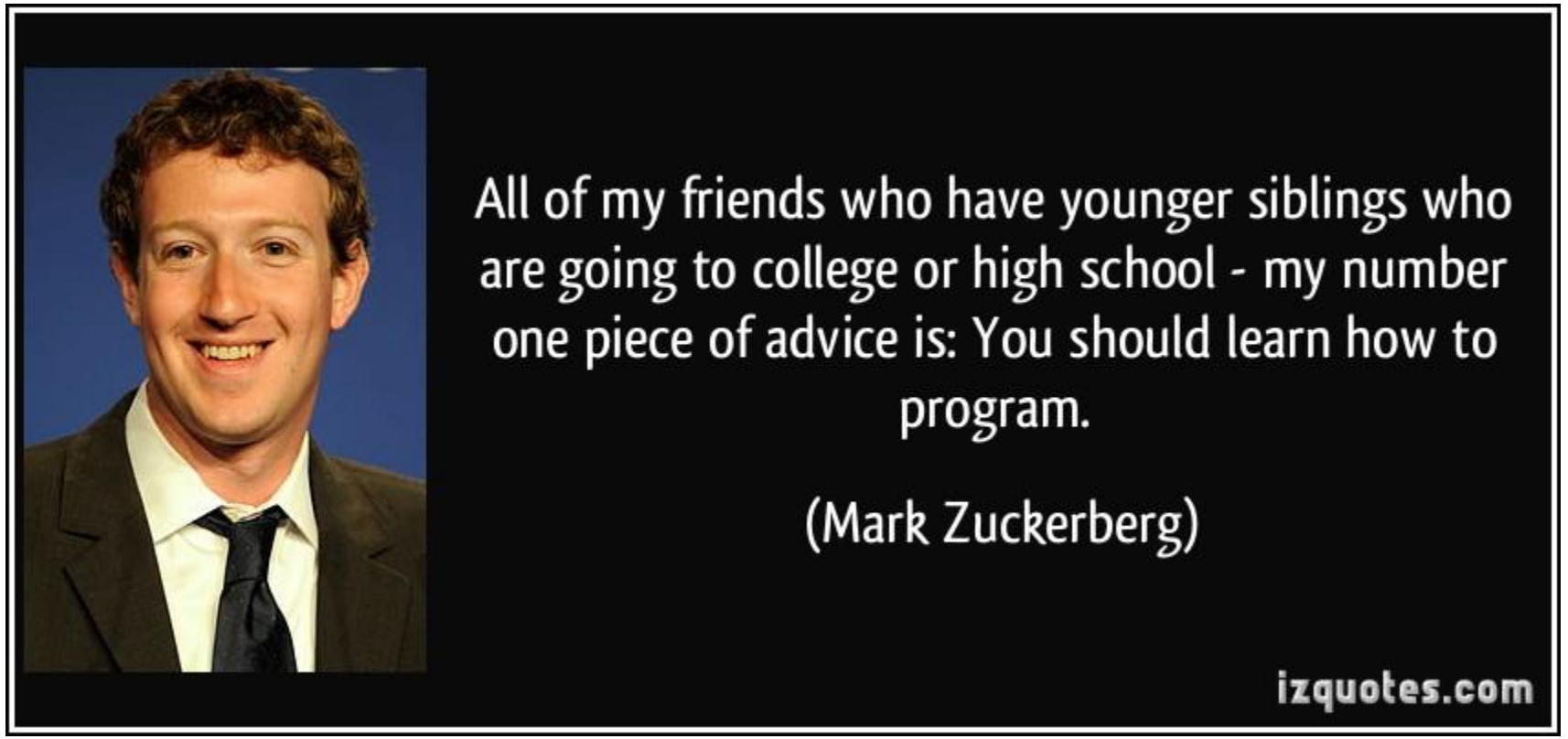
House Rules

- Put your phones in silent mode.
- Raise your hand if you have a question.
  - For clarifications, you may interrupt anytime.
  - If your question can wait, hold on to it till the end of the section.
- Maintain Silence.

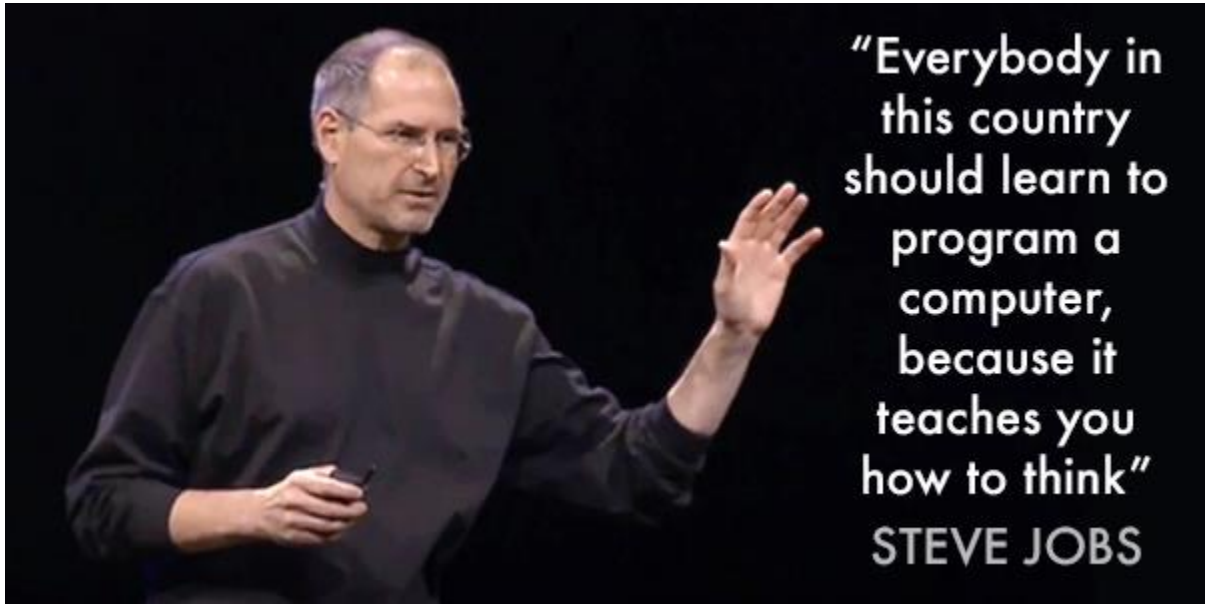
Course Objectives

- At the end of this course, you should be able to understand and write C programs up to 100 lines.
- Be able to think step-by-step, so as to write a computer program.
- Get proficient in developing and debugging programs written in C programming language
- Improve your problem solving skills

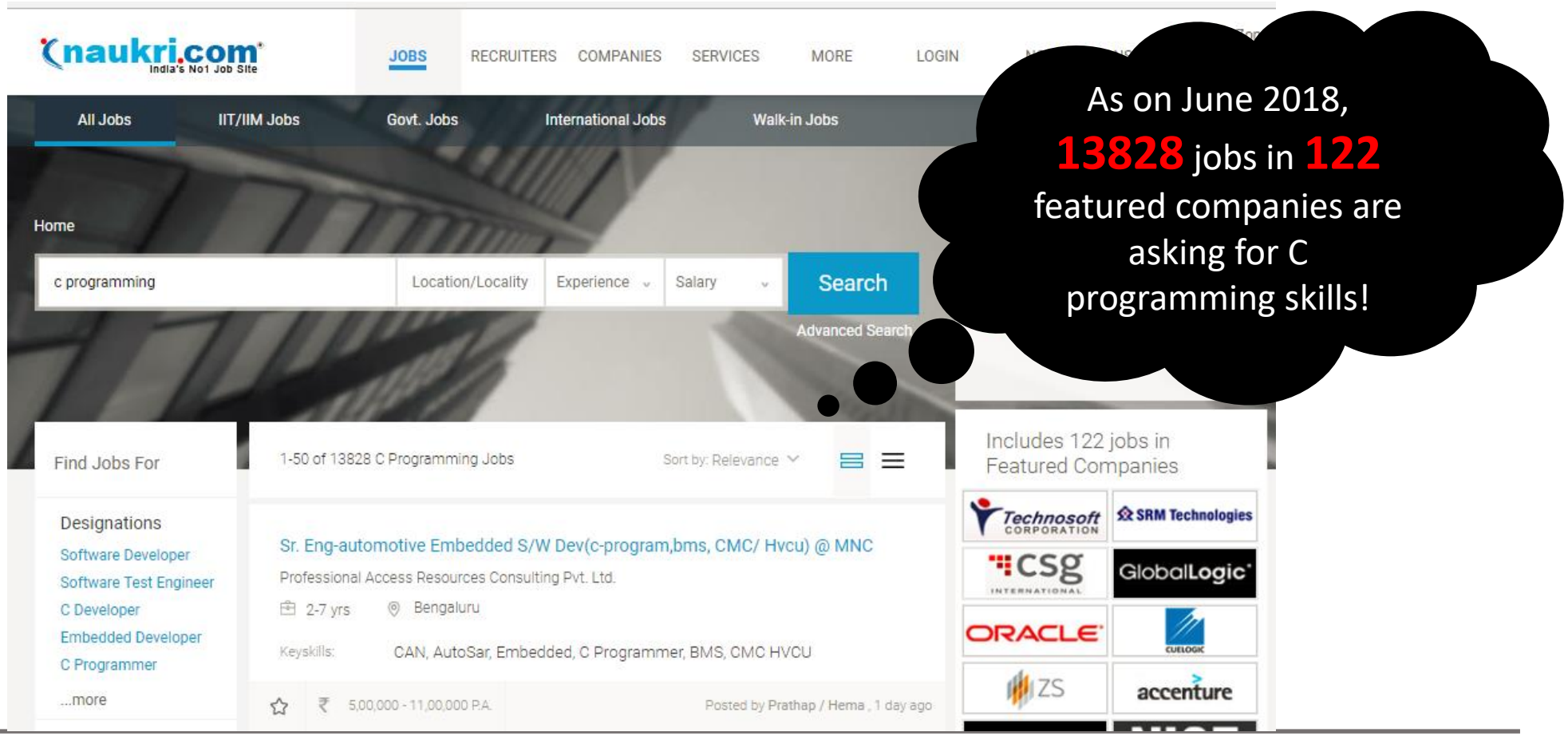
Why Learn to Code?



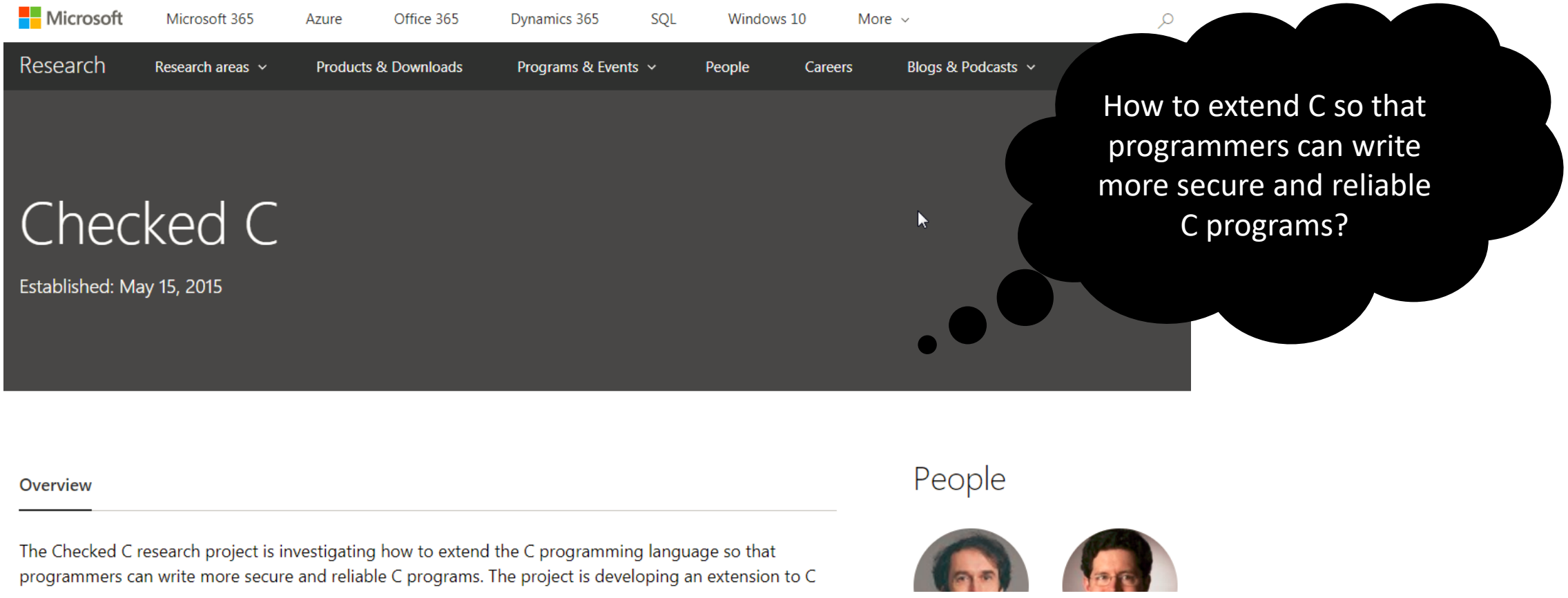
Why Learn to Code?



Why Learn C?


naukri.com
India's No1 Job Site
JOBS
RECRUITERS
COMPANIES
SERVICES
MORE
LOGIN
All Jobs
IIT/IIM Jobs
Govt. Jobs
International Jobs
Walk-in Jobs
Home
c programming
Location/Locality
Experience
Salary
Search
Advanced Search
As on June 2018,
13828 jobs in 122
featured companies are
asking for C
programming skills!
Find Jobs For
Designations
Software Developer
Software Test Engineer
C Developer
Embedded Developer
C Programmer
...more
1-50 of 13828 C Programming Jobs
Sort by: Relevance
Sr. Eng-automotive Embedded S/W Dev(c-program,bms, CMC/ Hvcu) @ MNC
Professional Access Resources Consulting Pvt. Ltd.
2-7 yrs
Bengaluru
Keyskills:
CAN, AutoSar, Embedded, C Programmer, BMS, CMC HVCU
5,00,000 - 11,00,000 P.A.
Posted by Prathap / Hema , 1 day ago
Includes 122 jobs in
Featured Companies
Technosoft CORPORATION
SRM Technologies
csg INTERNATIONAL
GlobalLogic
ORACLE
CUELOGIC
ZS
accenture

Researchers and Scientists Care for C!



Course Details

- Website: http://vvtesh.co.in/teaching/CP.html
- There are no pre-requisite courses for this course.
- Evaluation

Instrument	Max Marks
Midterm 1	15%
Midterm 2	15%
Final Exam	30%
Assignments (5 * 8% each)	40%
Bonus Project (optional)	0%

Project

- Optional.
- If you do it,
  - You will not get any marks.
  - It does not affect your grade.
- Then, why do it?
  - Gives you an opportunity to interact more with your instructor.
  - C is best learned by doing.
  - More work → More problems → More knowledge → More fun.

Exams

- Nature of Exams
  - All exams are of open-book type. Carry your own copy.
  - Exams test your understanding (and aptitude) of C.
- To be successful
  - Do not spend time memorizing definitions.
  - Understand ideas and concepts.
  - Practice. Practice. Practice.

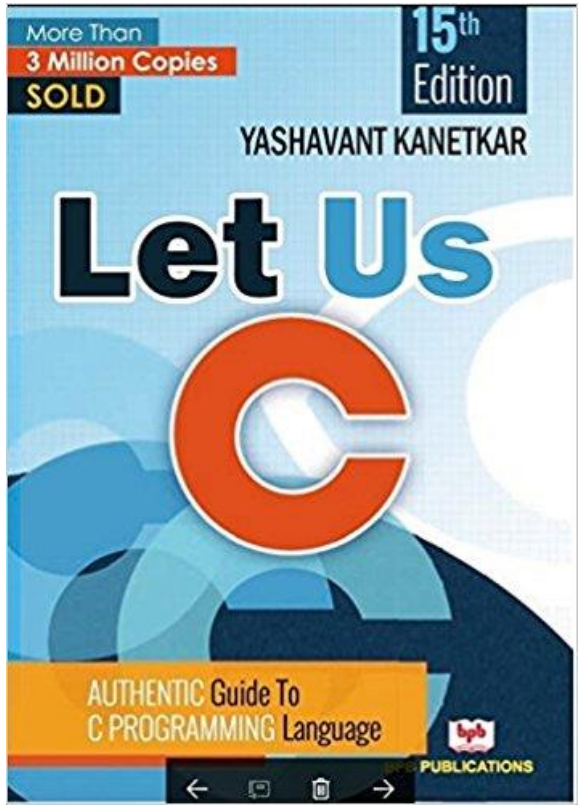
After the Class…

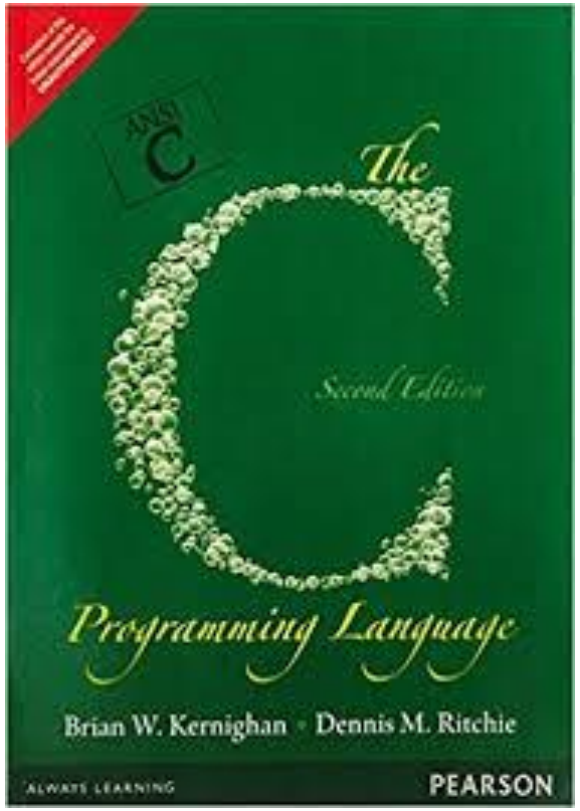
- Slides will be available at the course website.
- Keep a watch for course schedule, assignments, and announcements.

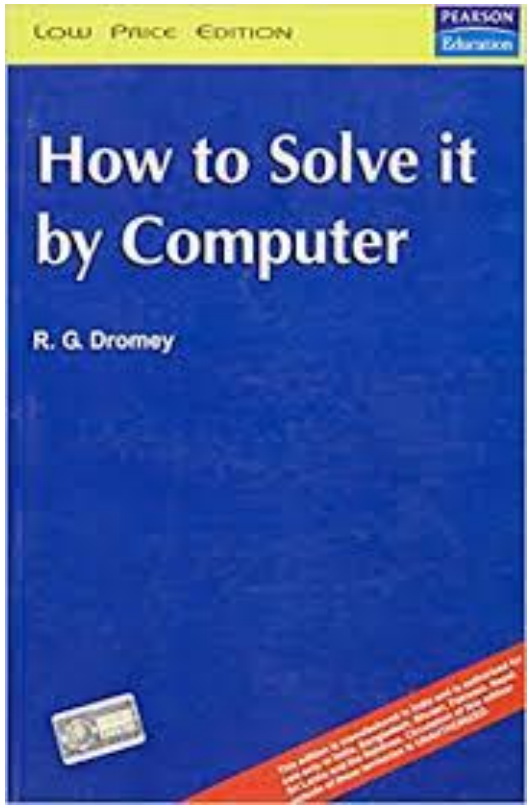
Schedule

Lecture	Topic	Readings	Lecture Slides	Labs/Tutorials	Assignment	Demo Code
1	Introduction	Chapter 1 and 2 from YK, C Mitch Resnick: Let's teach kids to code Learning to Code is Not Just for Coders	Lecture 1	Lab 1		hello.c guess.c
2	Decision and Case Control	Chapter 3, 4 and 7 from YK Chapter 3 from C			Assignment 1	
3	Loop Control	Chapter 5 and 6 from YK Chapter 3 from C				
4	Functions	Chapter 8 from YK Chapter 4 from C			Assignment 2	
5	Recursion	Chapter 10 from YK				
Midterm 1						
6	Pointers	Chapter 9 from YK				

Books


More Than
3 Million Copies
SOLD
15th Edition
YASHAVANT KANETKAR
Let Us
C
AUTHENTIC Guide To
C PROGRAMMING Language
BPB PUBLICATIONS


ANSI
C
The
C
Second Edition
Programming Language
Brian W. Kernighan · Dennis M. Ritchie
ALWAYS LEARNING
PEARSON


Low Price Edition
PEARSON Education
How to Solve it by Computer
R. G. Dromey

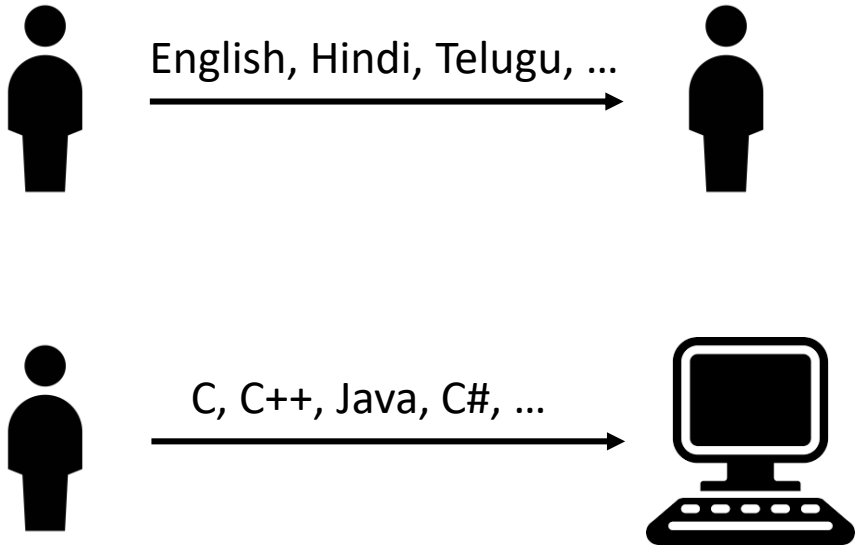
So, what did we discuss in Part I?

- House Rules
- About your Instructor
- Course Objectives
- Why Learn C?
- Course Details
- Project
- Exams
- Books

Part II

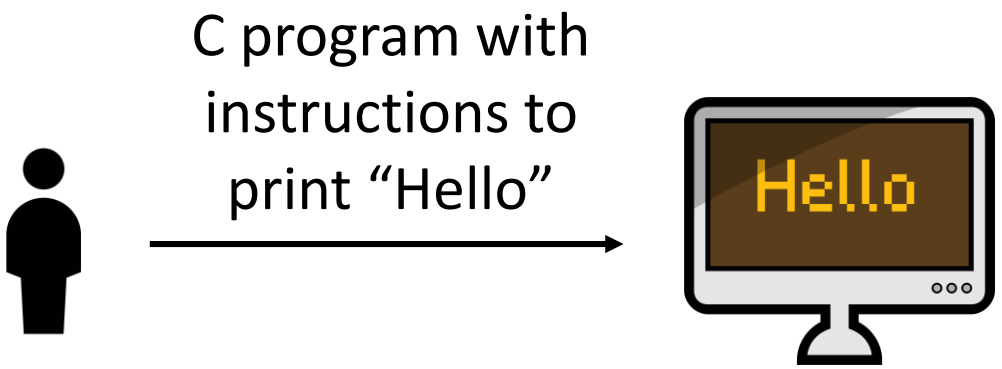
Write your first C program.

Communicating with the Computer

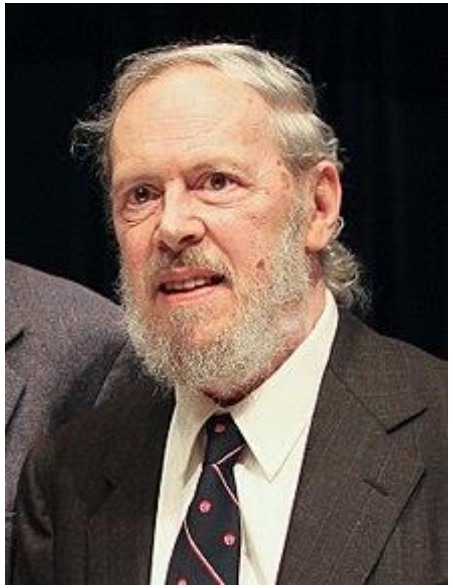


What is C?

- A way to communicate to the computer



Creator, C
Programming Language



Dennis Ritchie
1941 – 2011
Turing Award (1983)

Let us write a real C program

```c
#include <stdio.h>
int main()
{
    printf("Hello, World!");
}
```

Next Question: How to execute this program on a computer?

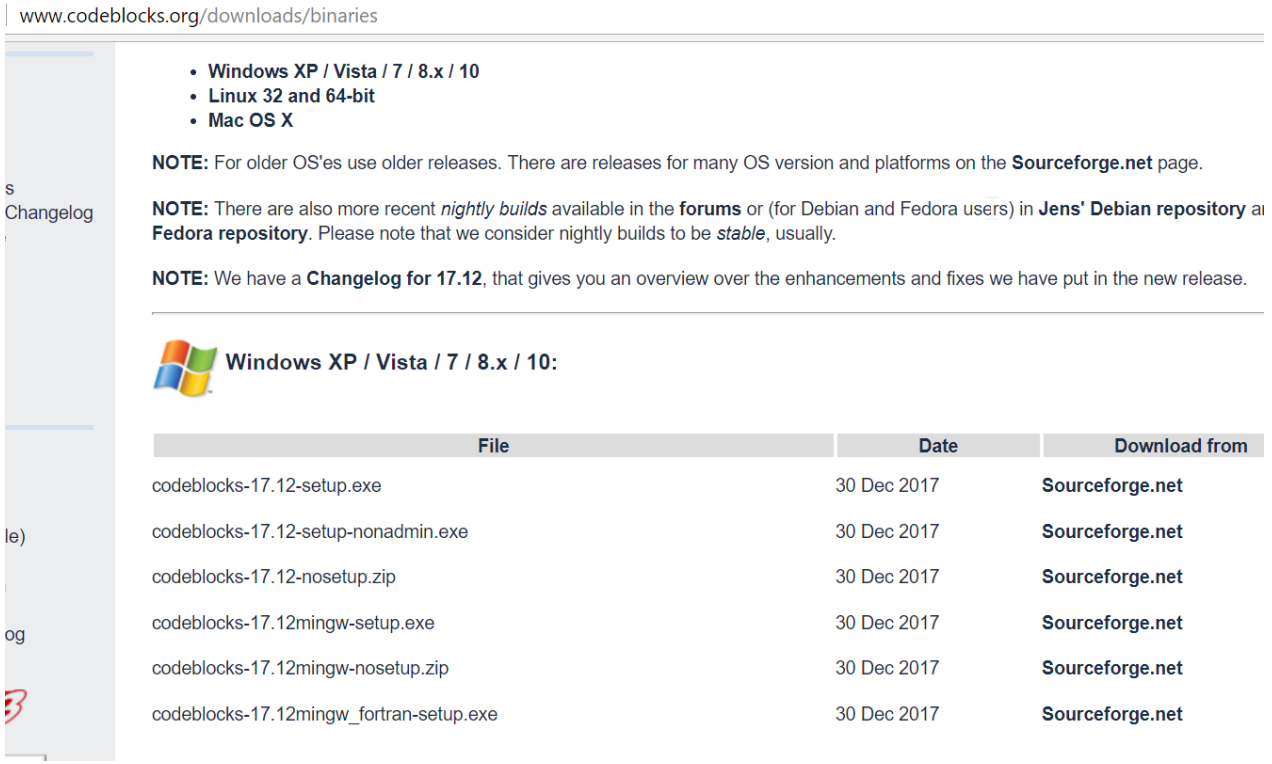
Demo

Editors

- You may use
  - Notepad
  - Code::Blocks
  - Visual Studio
  - Eclipse
  - … and many more editors
- We will use Code::Blocks in this course.

Code::Blocks Installation

Download the mingw-setup.exe version. It comes with the compiler.



www.codeblocks.org/downloads/binaries

- **Windows XP / Vista / 7 / 8.x / 10**
- **Linux 32 and 64-bit**
- **Mac OS X**

NOTE: For older OS'es use older releases. There are releases for many OS version and platforms on the **Sourceforge.net** page.

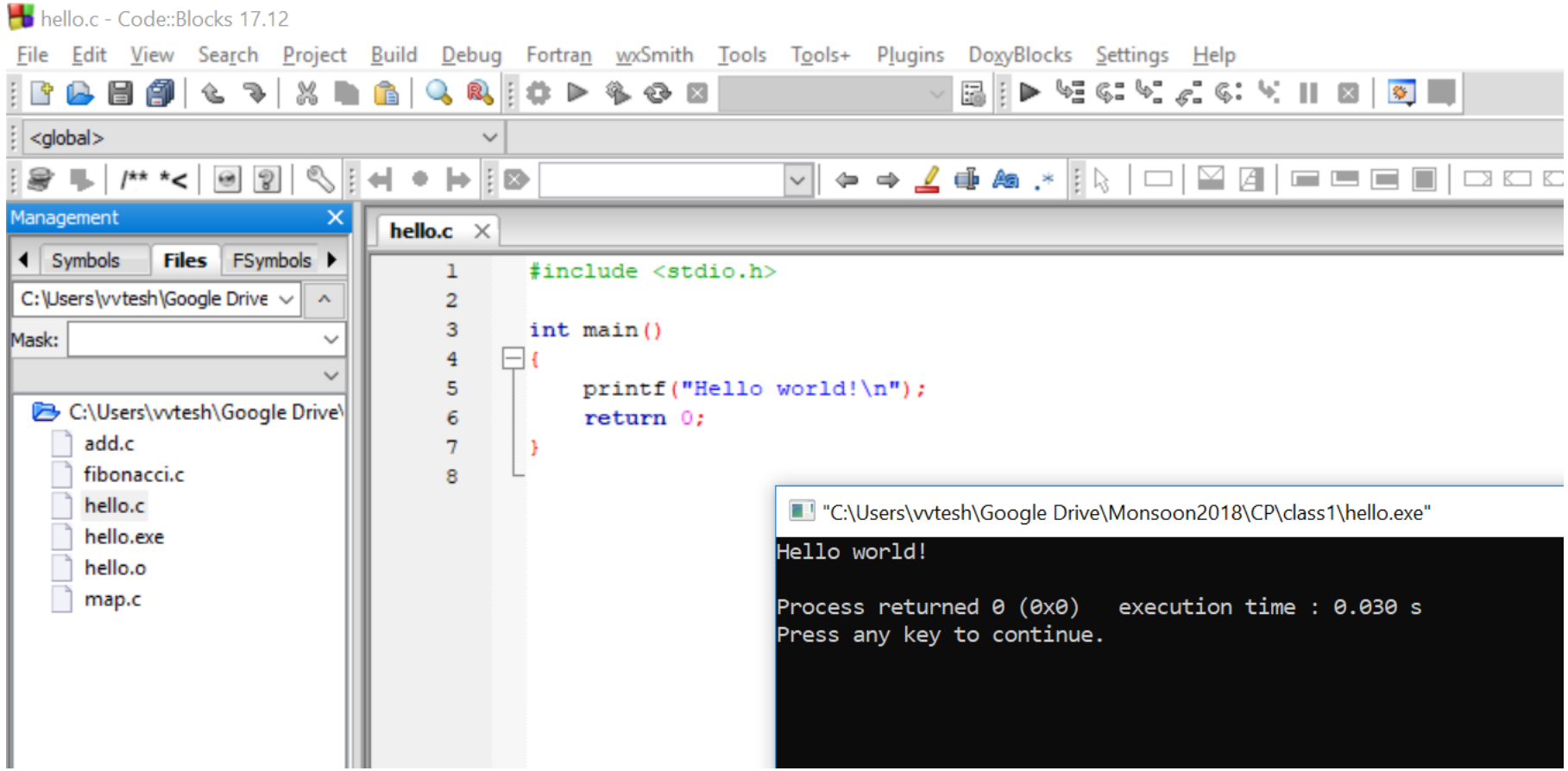
NOTE: There are also more recent *nightly builds* available in the **forums** or (for Debian and Fedora users) in **Jens' Debian repository** a **Fedora repository**. Please note that we consider nightly builds to be *stable*, usually.

NOTE: We have a **Changelog for 17.12**, that gives you an overview over the enhancements and fixes we have put in the new release.

Windows XP / Vista / 7 / 8.x / 10:

File	Date	Download from
codeblocks-17.12-setup.exe	30 Dec 2017	**Sourceforge.net**
codeblocks-17.12-setup-nonadmin.exe	30 Dec 2017	**Sourceforge.net**
codeblocks-17.12-nosetup.zip	30 Dec 2017	**Sourceforge.net**
codeblocks-17.12mingw-setup.exe	30 Dec 2017	**Sourceforge.net**
codeblocks-17.12mingw-nosetup.zip	30 Dec 2017	**Sourceforge.net**
codeblocks-17.12mingw_fortran-setup.exe	30 Dec 2017	**Sourceforge.net**

Our First Program and Its Output!



Live Demo

So, what did we discuss in Part II?

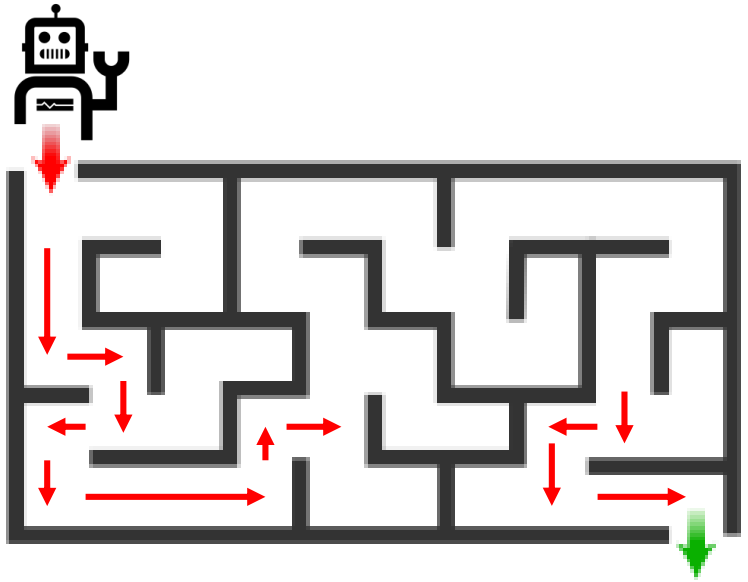
- What is C?
- Writing a C Program
- Compiling & Executing the Program

Part III

Computational Thinking: How to get good at writing programs?

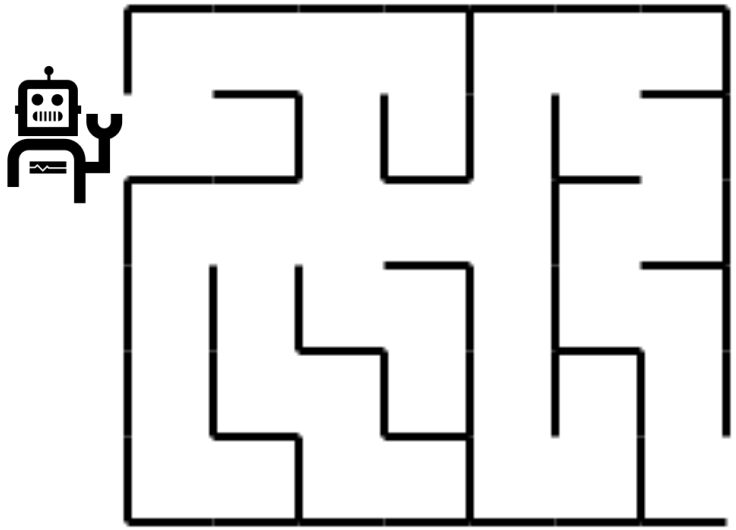
A Game

- You can only issue one of the four commands: right, left, up, down.
- The robot here will follow your command.
- Take the robot from source to destination. Give "**Instructions**".



Answer: down, right, down, left,
down, right, up, right,
…
down, left, down, right, down.

Can you give me the "instructions" now?



Which of these is the most likely set of instructions to take the robot to its destination (efficiently) ?

1. Right, up, right, down, right, up, …
2. Right, up, right, up, right, up, …
3. Right, up, left, left, down, right, …
4. Right, left, right, left, right, left, …

Flowcharts

- Flowcharts give a step-by-step description of a workflow.
- For example, what do you do when a lamp doesn’t work?

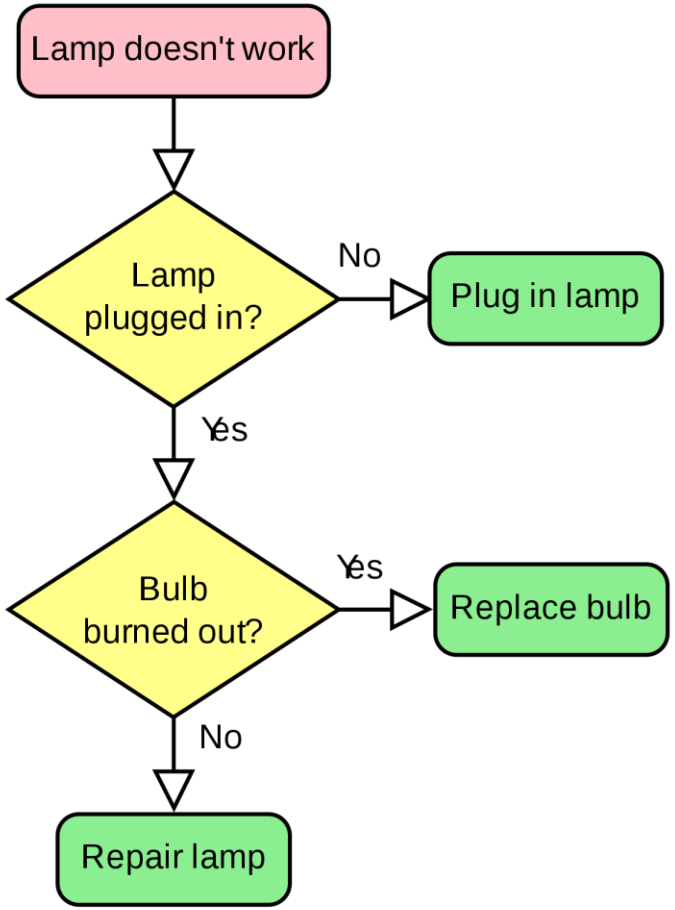
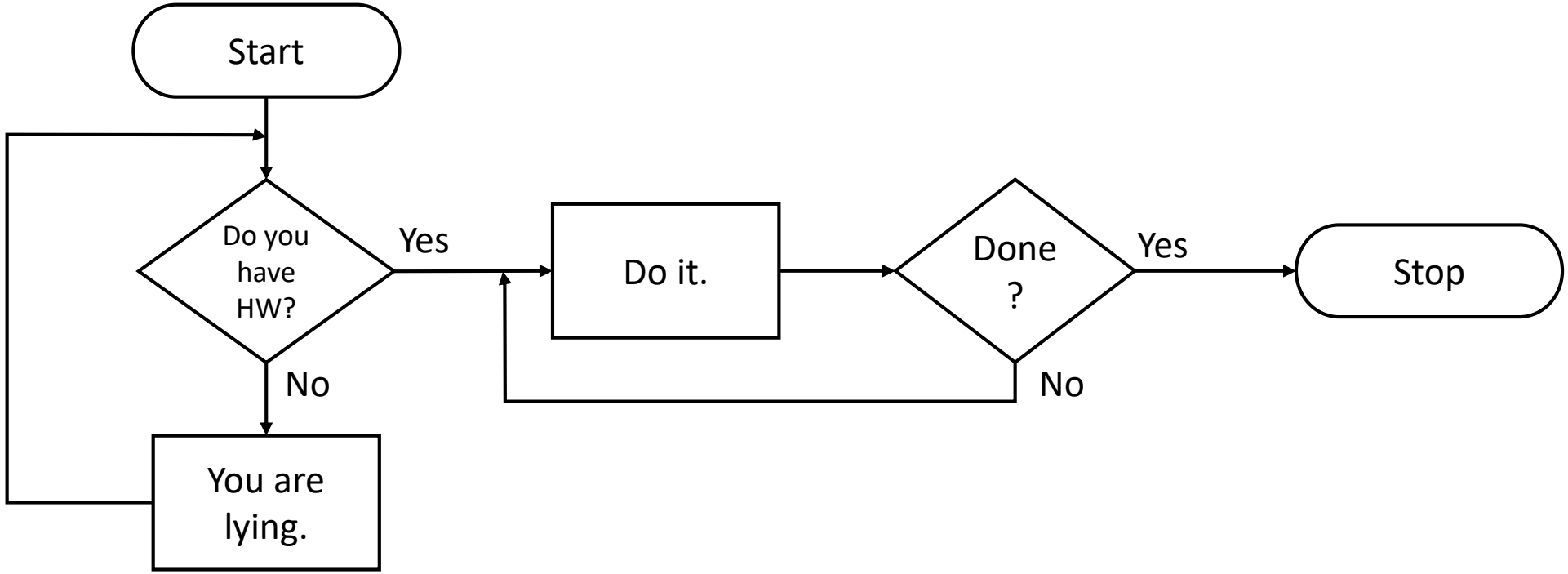


Image Source: Wikipedia.

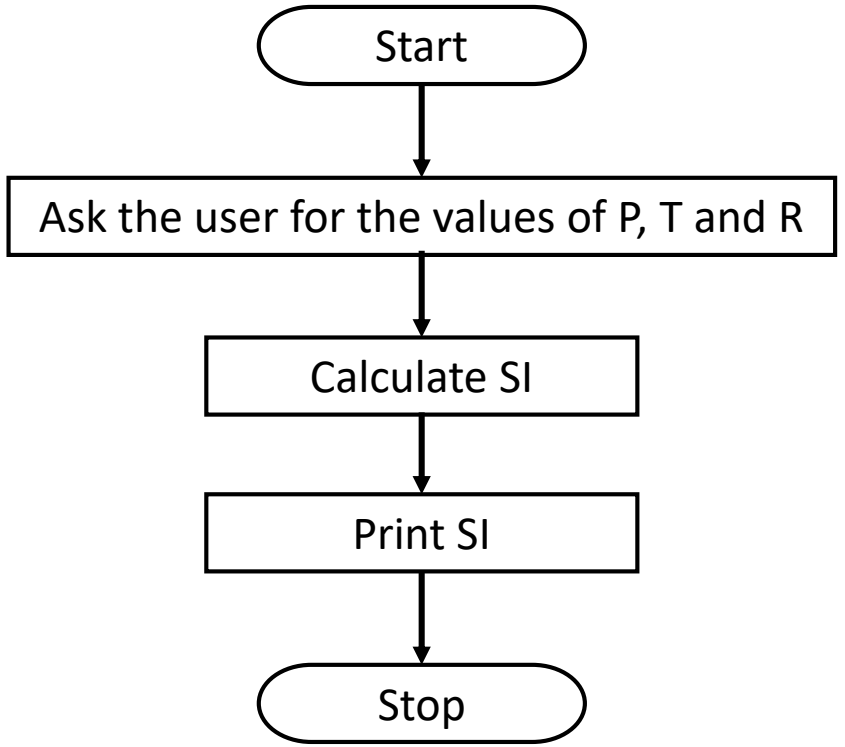
Another Flowchart Example

- Should I do my homework now?

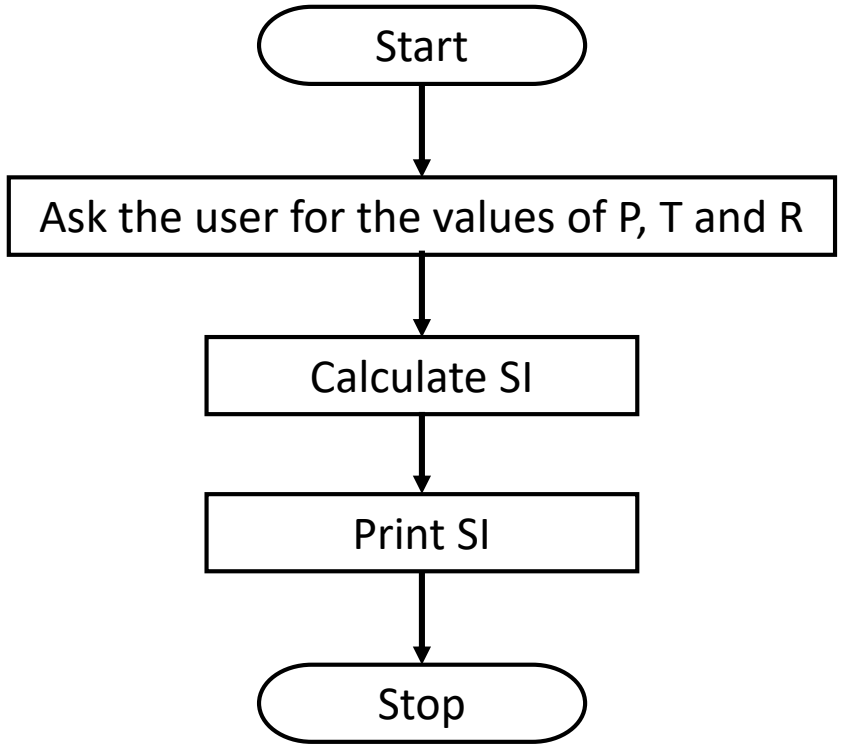


Write a C Program to Calculate Simple Interest

- First, we need to know the formula
  - Simple Interest, SI = $\frac{P * T * R}{100}$
    - Where P is Principal, T is Time, R is Rate
- Next,
  - Step1: Let us draw the flowchart
  - Step2: Write the C code

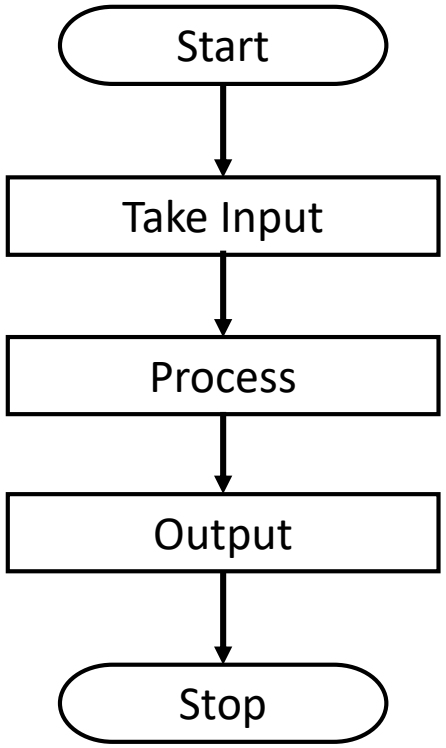


Converting Flowchart to C Code




```c
#include<stdio.h>

int main() {
    int amount, rate, time, si;

    printf("\nEnter Principal: ");
    scanf("%d", &amount);

    printf("\nEnter Rate of Interest: ");
    scanf("%d", &rate);

    printf("\nEnter Time: ");
    scanf("%d", &time);

    si = (amount * rate * time) / 100;
    printf("\nSimple Interest : %d", si);

    return(0);
}
```

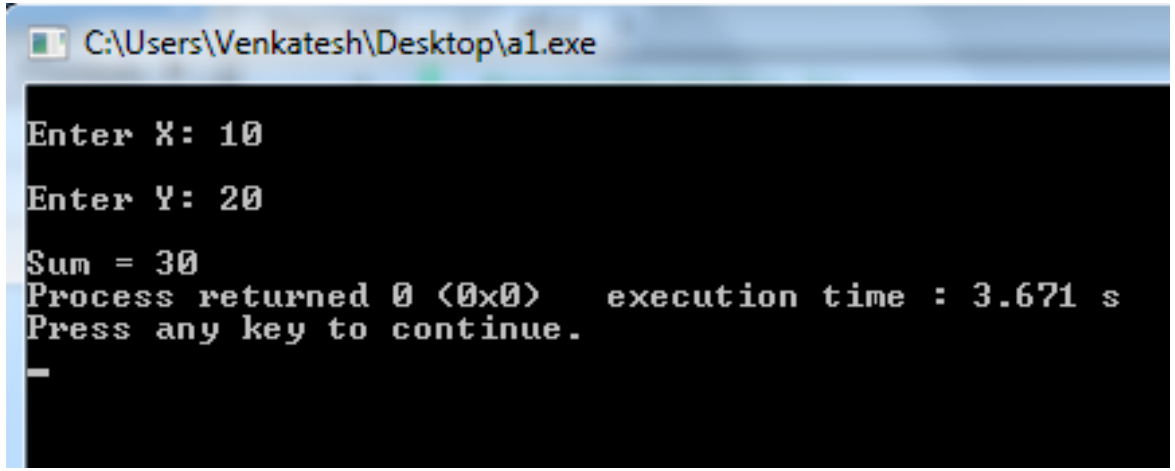
Simple Programs




```c
#include<stdio.h>

int main() {
    int amount, rate, time, si;

    printf("\nEnter Principal: ");
    scanf("%d", &amount);

    printf("\nEnter Rate of Interest: ");
    scanf("%d", &rate);

    printf("\nEnter Time: ");
    scanf("%d", &time);

    si = (amount * rate * time) / 100;
    printf("\nSimple Interest : %d", si);

    return(0);
}
```

Add Two Numbers

```c
#include<stdio.h>

int main() {
    int x,y,result;

    printf("\nEnter X: ");
    scanf("%d", &x);

    printf("\nEnter Y: ");
    scanf("%d", &y);

    result = x + y;
    printf("\nSum = %d", result);

    return(0);
}
```



Lab 1

- Refer to course website.

Why is programming in C, so difficult?

- Surveyed 18,738 students
  - Most were in final year, or have just completed their BTech in CSE.
  - These are students aspiring to give the GATE exam, to join PSU, MTech or PhD programs.
- The first response
  - *”…it involves thinking & we have been programmed by our respective school boards to not think.”*

Interesting Responses

- “ I started coding in my 2nd sem & by the start of 5th sem I was better than most of my friends who were coding since school only because I was honest in learning.”
- “teachers are not taking the practical aspects of programming language with importance.”
- “the best way to make them understand is by relating it to real life things.”
- “One require continuity and a lot of patience to improve in coding skills. Most of us wants to do things that won't take much time. They don't want to struggle in a code which would take 3-4 hrs or more.”

More Responses…

- “Everything individually sounds great but the correct use make the short circuit in brain. That is most of my fellowmate and I are bad programmers”
- “Some were already good before coming to college, some learnt stuff pretty fast, some like me who were left behind just gave up.”
- “most of them are afraid of syntax but not the algo.”

Key Results from the Survey

- We are afraid of the syntax (instructions), but not the ideas.
  - We should focus on the practical part.
  - Boring to copy syntax from book.
- We are not trained to think.
  - C programming requires a different way of thinking.
  - It is a very new thing which makes students uncomfortable.
- Debugging errors is difficult. Patience is an important quality for a coder.

So, what did we discuss in Part III?

- Instructions
- Flowcharts
- Converting flowchart to C code
- Why is C programming difficult?

Questions?

Hold on. There is one more slide.

What Can We Do…

Is only limited by our imagination

Can you guess what this little C program will output?

Demo

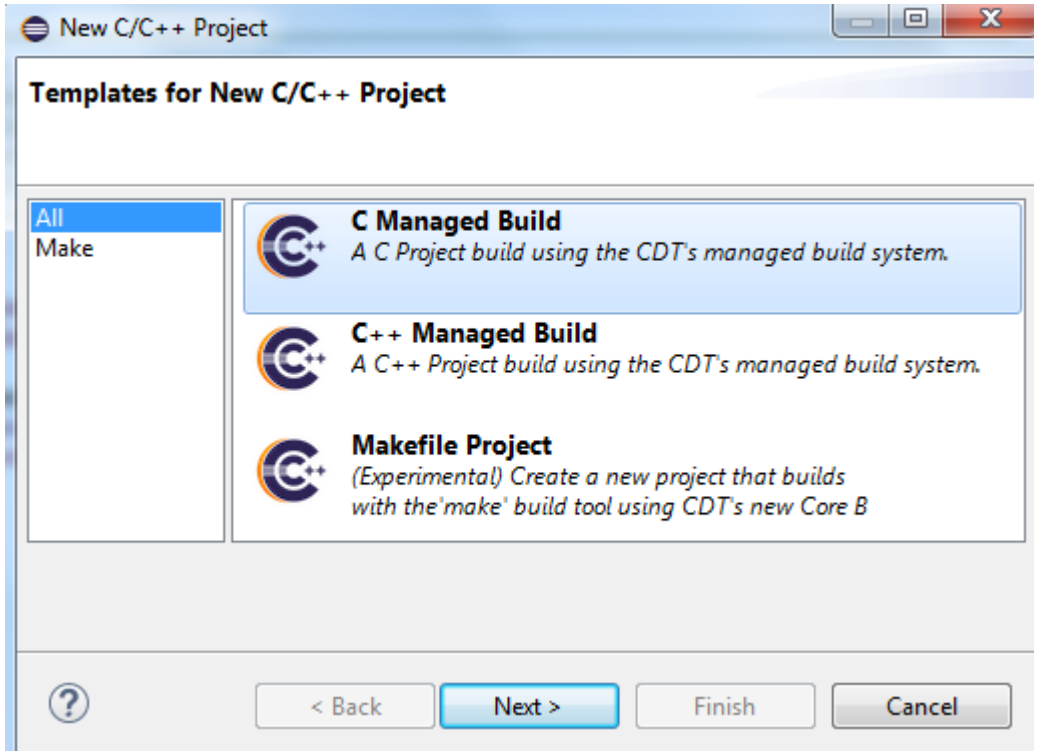
Annexure

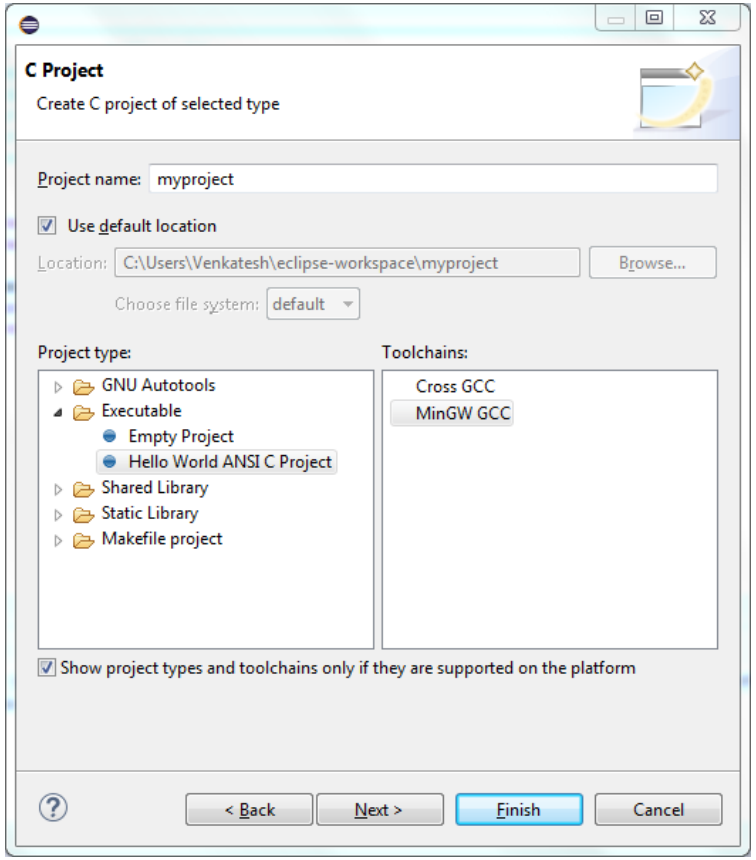
Using Eclipse

Install Eclipse CDT and MinGW

- Linux, Windows and Mac users
  - Install the latest “Eclipse IDE for C/C++ Developers”
    - Visit https://www.eclipse.org/downloads/packages/
- For Windows Users
  - Install the latest “Minimalist GNU for Windows”
    - Visit http://mingw.org/.

Create a new C Project





Build and Run