Introduction to Programming

Lecture 1 : Orientation

MTech CS – First Year
Indian Statistical Institute

Sourav Sen Gupta
sg.sourav@gmail.com

Welcome to ISI Kolkata!

About this course

Introduction to Programming (A1)

Target audience : MTech (CS) First Year
Instructor : Sourav Sen Gupta (sg.sourav@gmail.com)

- Lectures : Monday and Thursday (11:15-13:00)
- Venue : CSSC Lab, 4th Floor, Library Building
- Assign : Mid-Sem : End-Sem = 20 : 30 : 50

```
www.souravsengupta.com/int2pro2014/
```

About this course

Introduction to Programming (A1)

You may like the following books.

- The C Programming Language – Kernighan and Ritchie
- Write Great Code (1 & 2) – Randall Hyde
- Programming Pearls – John Bentley
- How to Solve it by Computer – Dromey
- The Elements of Programming Style – Kernighan and Plauger
- The Practice of Programming – Kernighan and Pike
- Beautiful Code – O'Reilly Publication

About this course

Introduction to Programming (A1)

You must follow the basic rules and regulations.

- Turn cellphones silent in class. I will answer the call if it rings!
- Attendance is mandatory, unless you have an irrefutable excuse.
- Plagiarism will not be tolerated. Acknowledge every form of help.

You are expected to submit all assignments if you are attending the lectures, and even if you are not taking this course for credit.

Coding Environment

Coding environment

Server : 192.168.54.156

Login : ssh -X mtc14{RR}@192.168.54.156
where mtc14{RR} is your MTech roll number.

- Create working directory : mkdir int2pro2014
- Go to working directory : cd int2pro2014
- Create daywise directory : mkdir lecture{MM}{DD}
- Go to daywise directory : cd lecture{MM}{DD}
- Create file : gedit mtc14{RR}-{MM}{DD}-prog{NN}.c &

Coding environment

Use basic Linux commands to explore your coding environment.

Command	Description
`mkdir <dir>`	Create a new directory
`cd <dir>`	Move to an existing directory
`pwd`	Show the path of current directory
`ls`	Show all files in current directory
`ls -lsa`	Show details of all files and folders
`touch <file>`	Create or update a file
`gedit <file>`	Open file in native text editor 'gedit'
`cat <file>`	Show contents of file within the terminal
`rm <file>`	Remove or delete the file
`cp <source> <dest>`	Copies source file to destination
`mv <source> <dest>`	Moves or renames source file to destination

The Art of Programming

Problem 1

What does this code snippet do?

```
int arr[10][10], i, j;

for (i = 0; i < 10; i++) {
  for (j = 0; j < 10; j++) {
    arr[i][j] = (i/j)*(j/i);
  }
}
```

Problem 1

What does this code snippet do?

```
int arr[10][10], i, j;

for (i = 0; i < 10; i++) {
  for (j = 0; j < 10; j++) {
    arr[i][j] = (i/j)*(j/i);
  }
}
```

Exercise : Write a *clearer* version of this code snippet.

Problem 2

What does this code snippet do?

```
subkey = subkey >>
        (bitoff - ((bitoff >> 3) << 3));
```

Problem 2

What does this code snippet do?

```
subkey = subkey >>
         (bitoff - ((bitoff >> 3) << 3));
```

Exercise : Write a *clearer* version of this code snippet.

Problem 3

Write a code to output k-th Fibonacci number, where input $k \sim 10^{25}$.

$$F_0 = 0, \quad F_1 = 1, \quad \text{and} \quad F_n = F_{n-1} + F_{n-2} \text{ for } n \geq 2$$

Problem 3

Write a code to output k-th Fibonacci number, where input $k \sim 10^{25}$.

$$F_0 = 0, \quad F_1 = 1, \quad \text{and} \quad F_n = F_{n-1} + F_{n-2} \text{ for } n \geq 2$$

Think : What is the time complexity for this code?

Problem 4

Write a code to output $\gcd(a, b)$, where inputs $a, b \sim 10^{25}$.

Problem 4

Write a code to output $\gcd(a, b)$, where inputs $a, b \sim 10^{25}$.

Think : What is the time complexity for this code?

Problem 5

1. Given a list of 1000 integers, sort them in ascending order.
2. Given a list of 1000 integers, find the maximum number.
3. Given a list of 1000 integers, find the minimum number.
4. Find a number which is neither the maximum nor the minimum.

Problem 5

1. Given a list of 1000 integers, sort them in ascending order.
2. Given a list of 1000 integers, find the maximum number.
3. Given a list of 1000 integers, find the minimum number.
4. Find a number which is neither the maximum nor the minimum.

Think : What is the time complexity for each of the above codes?

Problem 5

1. Given a list of 1000 integers, sort them in ascending order.
2. Given a list of 1000 integers, find the maximum number.
3. Given a list of 1000 integers, find the minimum number.
4. Find a number which is neither the maximum nor the minimum.

Think : What is the time complexity for each of the above codes?

Given a list of atmost 1000 *integers, all different and each bounded within the range* [0, 999], *sort them in ascending order.*

THANK YOU
for your kind attention

www.souravsengupta.com/int2pro2014/

Email: sg.sourav@gmail.com | Office: ext3251