



Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Fall Term 2014



SYSTEMS PROGRAMMING AND COMPUTER ARCHITECTURE

Assignment 2: Introduction to C Programming

Assigned on: **25th Sep 2014**
Due by: **2nd Oct 2014**

Introduction to C Programming

This exercise consists of small C programming problems.

1 Reverse an array

Write a C program that has a function that:

- accepts an array of 32-bit unsigned integers and a length
- reverses the elements of the array in place
- returns void (nothing)

2 Function pointers basics

Write a C program that has a function that:

- accepts a function pointer (pointing to a function with void return type) and an integer as arguments
- invokes the pointed-to function with the integer as its argument

3 First whitespace-separated word

Write a C program that has a function that:

- accepts a string as a parameter
- returns the first whitespace-separated word in the string (as a newly allocated string) and the size of that word

4 Box-and-arrow diagram

Use a box-and-arrow diagram for the following program to explain what it prints out:

```
#include <stdio.h>

int foo(int *bar, int **baz)
{
    *bar = 5;
    *(bar+1) = 6;
    *baz = bar+2;
    return *((*baz)+1);
}

int main(int argc, char **argv)
{
    int arr[4] = {1, 2, 3, 4};
    int *ptr;
    arr[0] = foo(&(arr[0]), &ptr);
    printf("%d %d %d %d %d\n",
        arr[0], arr[1], arr[2], arr[3], *ptr);
    return 0;
}
```

5 Little vs. big endian

Write a C program that prints out whether the computer it is running on is little endian or big endian. (hint: pointer arithmetic from the lecture)

6 Binary search tree

Implement and test a binary search tree¹ in C:

- implement key insert() and lookup() functions
- implement it as a C module: bst.c, bst.h
- implement test_bst.c (contains main(), tests out your BST)
- don't worry about making it balanced
- as a bonus implement a key delete() function

Hand In Instructions

Question 4 is a pen-and-paper exercise. Hand it in to your assistant during the exercise session. For the rest of the problems, upload your source files to a subfolder named **assignment2** in your SVN folder. Refer to Assignment 1 for instructions on using SVN.

¹http://en.wikipedia.org/wiki/Binary_search_tree