Intermediate C Programming

Introduction

Sep 27th 2013

Instructor Introduction

- Dr. Zhou Su

- Doctor obtained from Waseda University
- Assistant Professor, Waseda University
- zhousu@asagi.waseda.jp

TA Introduction

- Feel free to ask any help during the course!

Attendance Requirement

- TA will assign a roll card to take attendance at the beginning of the class.
- For the students who are late more than 10 minutes can not attend the class.
- PLEASE log in the Unix system during the time of class to ensure your attendance.
- The status of your attendance can be confirmed by course navi.

Report

- All students need to submit two reports.
- The details of reports will be given during the time of exercise class.

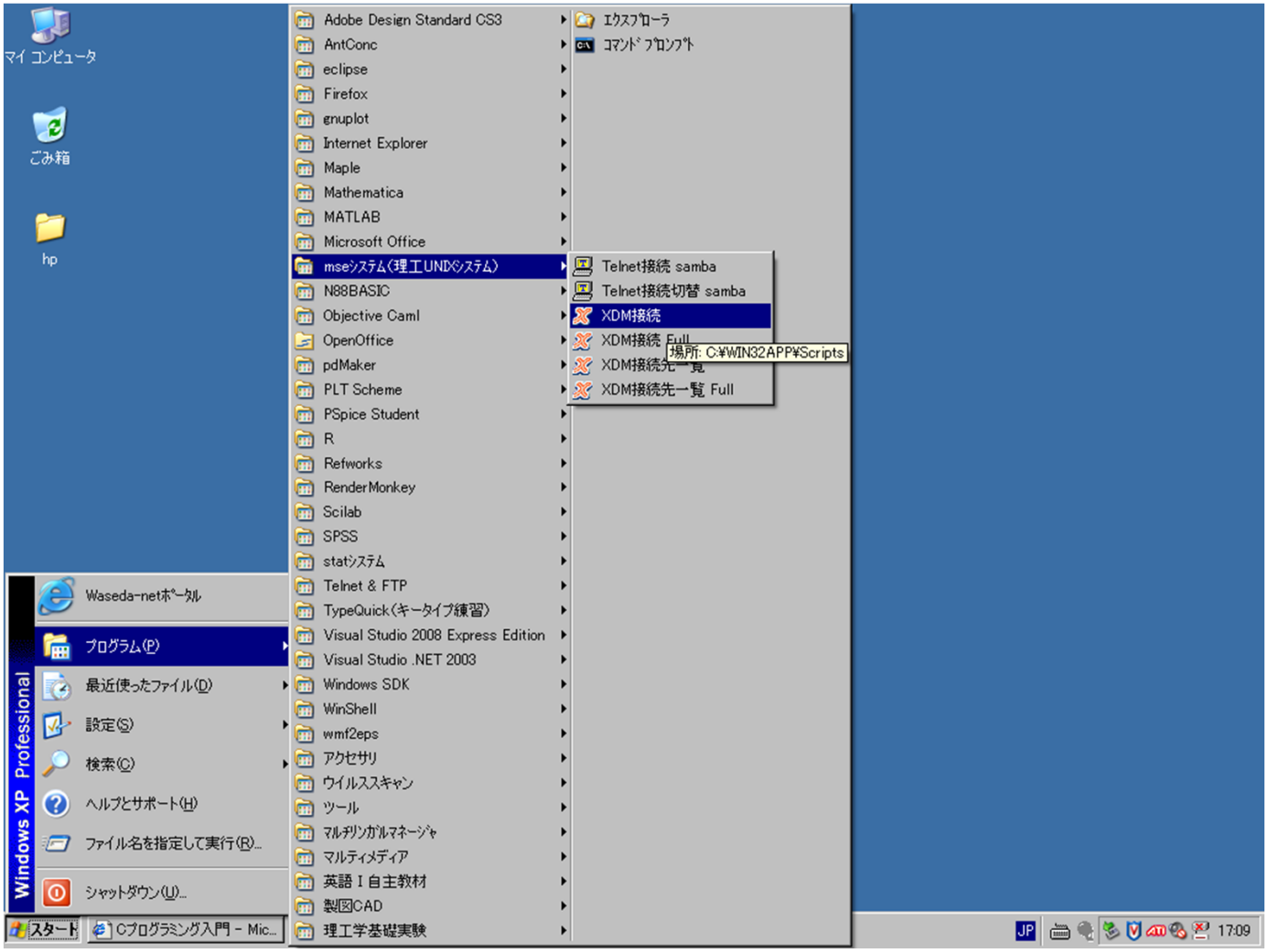
Grade Policy

- Grades will be computed by the reports and the percentage of attendance
- There is a final test for this course.
- The percentage of attendance must be more then 2/3 to get the credit.

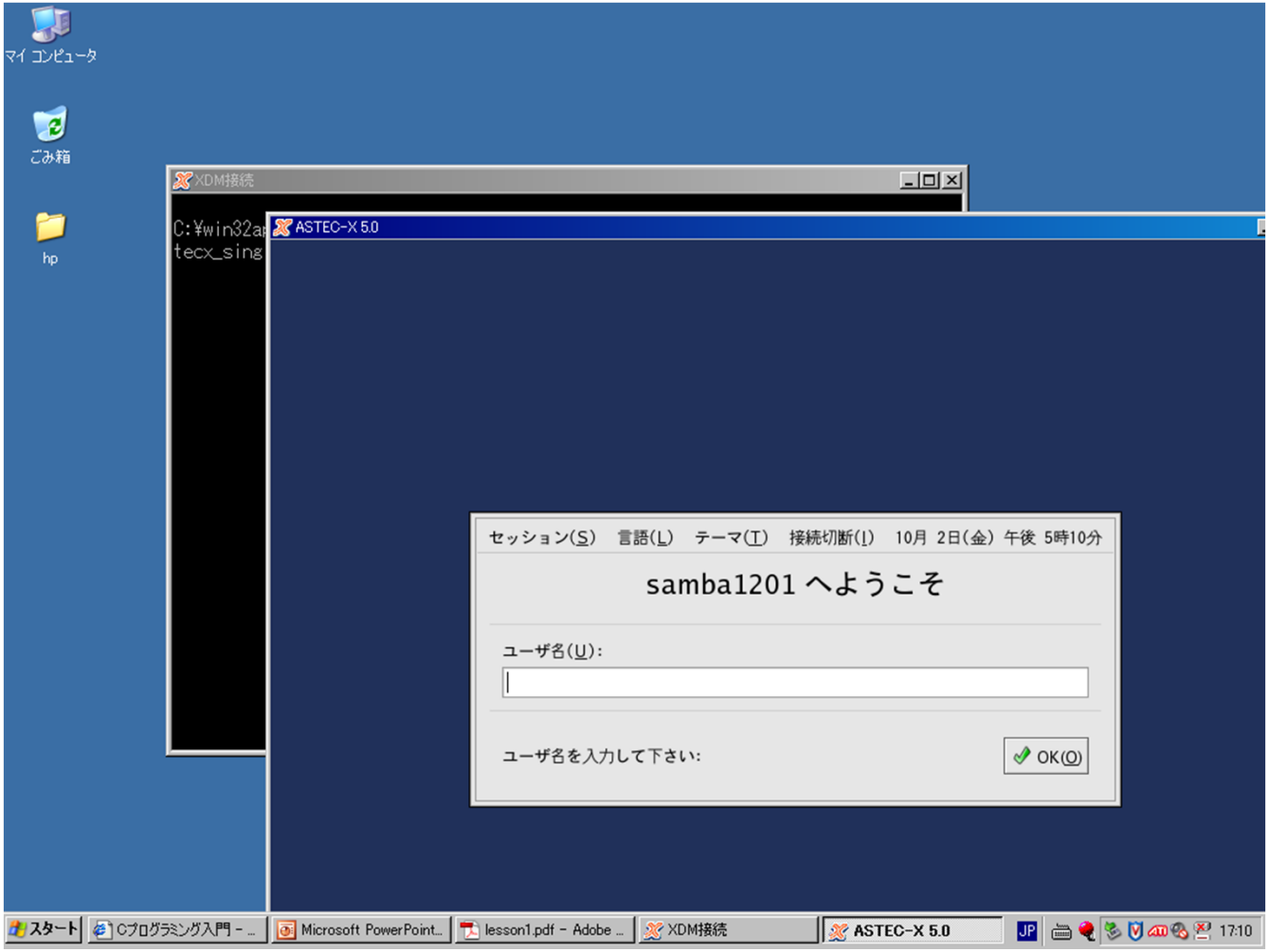
Today's Outline

- OS
- Log-in and Log-out in Unix System
- Review of C Programming

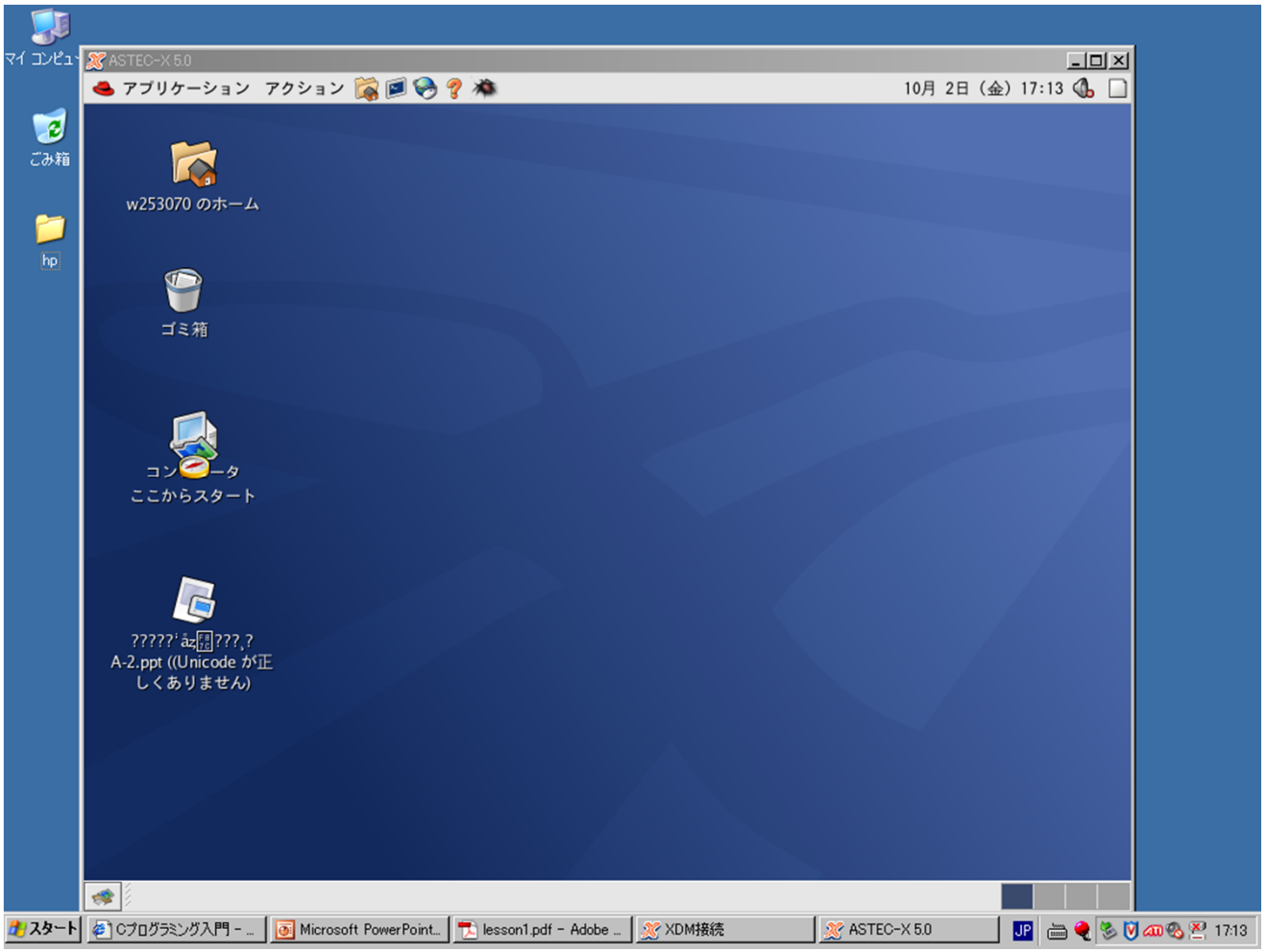
Log-in and Log-out in Unix System



Log-in and Log-out in Unix System



GNOME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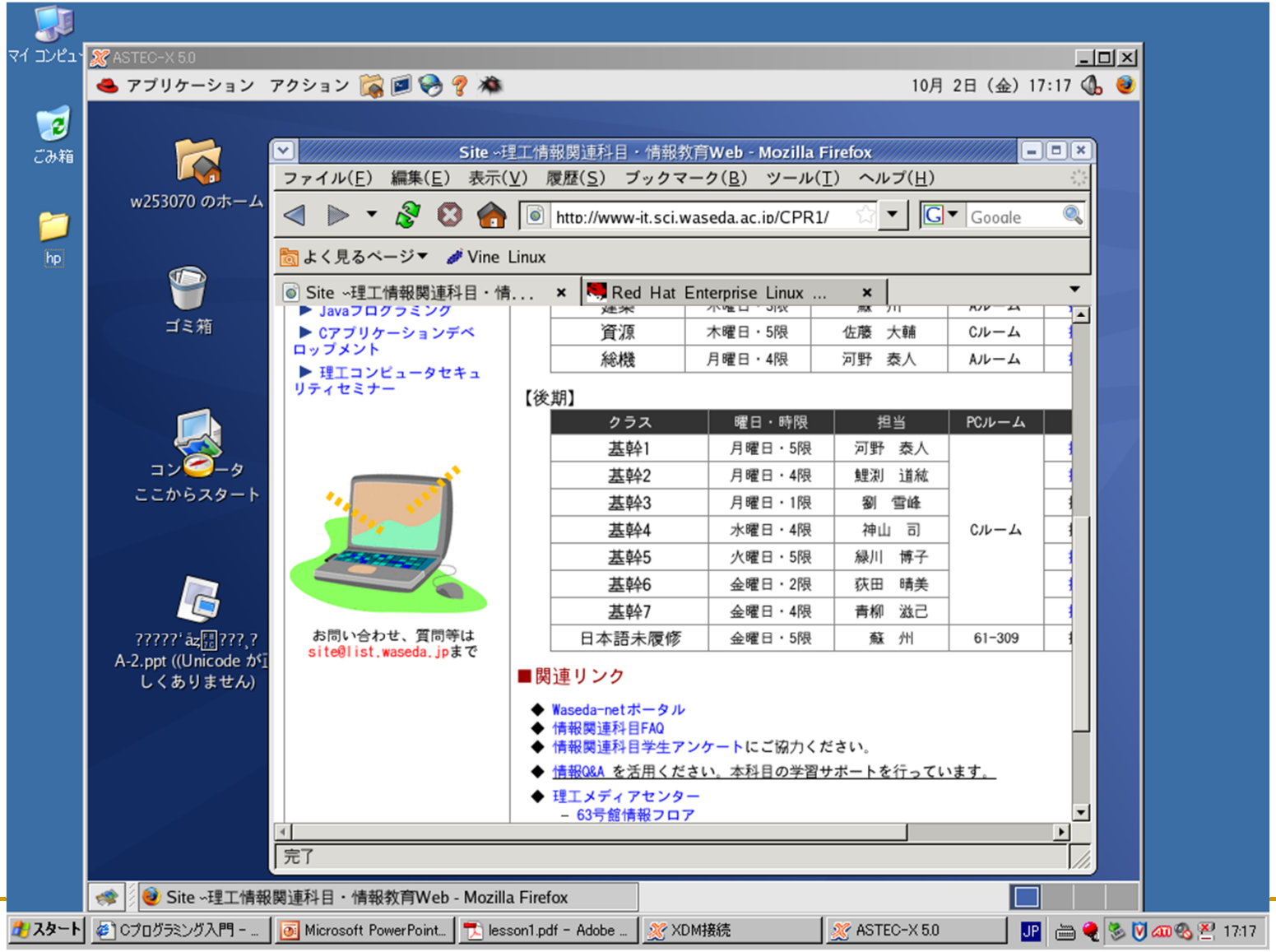
Course HP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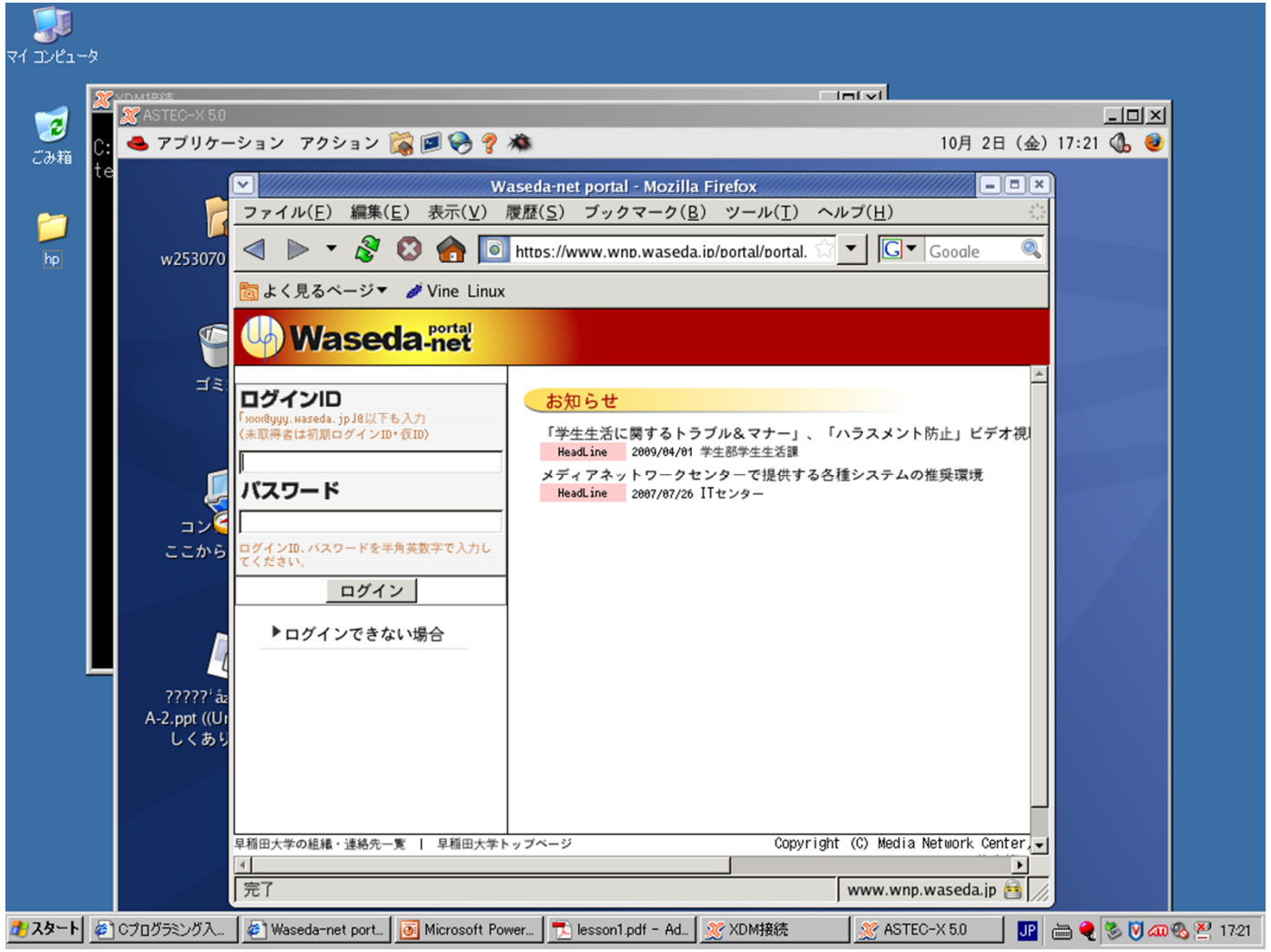
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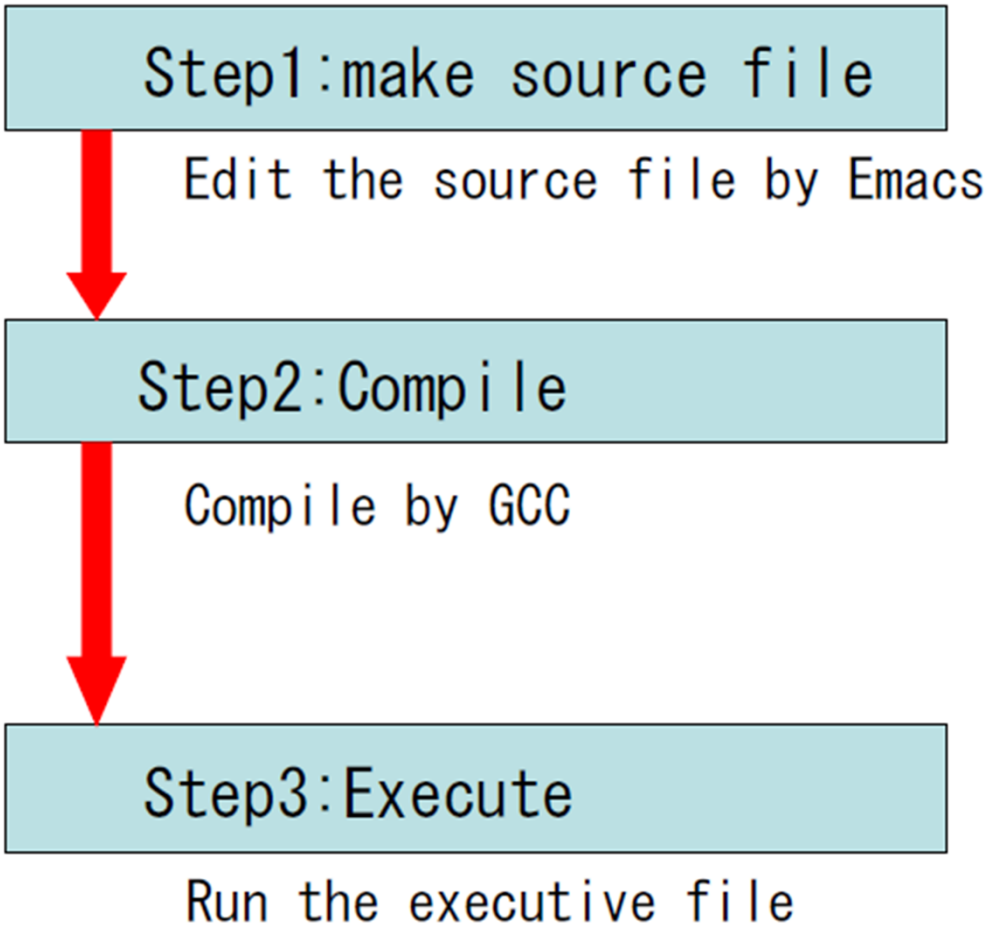
C Programming



Emacs

Make New File

```
emacs  hello.c  &
```

```
#include <stdio.h>

int main(void)
{
    printf("hello, world¥n");

    return 0;
}
```

¥ could be ＼(back slash) according the comupter environment

⇒ Click "Save" icon to save the file

Compile

GCC(GNU Compiler Collection)
GNOME：

```
gcc [Option] [File]
```

```
$ ls ↵
hello.c
$ gcc  hello.c ↵          (Compile「hello.c」)
$
```

⇒If there is no error message, compiling is success
  Otherwise, grammar mistakes exist

⇒Revising the source file by Emacs
  And compile it again

Execute

(a.out) will be created after the compiling

Run a.out at GNOME :

```
$ ls ↵
a.out  hello.c
$ ./a.out ↵                    (Run「a.out」)
hello, world
```

Variables

- Variables are used to declare values and strings
- Declaration is neccesary before using variables.
- Type of Variables
- Type can be divided by :

Type	Details
int	Integer
long	Long integer
float	Floating point numbers
double	Double precision
char	Character

- Variables Declaration :

  Type Name;

For Example
```
int  height, weight;
double  height_m;
```

Output

printf( ) : To output variable values and charactors

charactors

```
printf("hello, world¥n");
```

- contents within "...." will be printed
- change line「¥n」.

variable values

```
printf("%d¥n", height);
```

- Output variable「height」' value.
- %: specifier
- define the type
  and the interpretation of the value

specifier	detials
%d	decimal integer
%x	hexadecimal integer
%f	Decimal floating point
%e	exponent
%c	character

Input from the keyboard

scanf( ) : input the value of variable from the keyboard

```
scanf("%d", &height);
```

- The value inputted by the keyboard will be assinged to 「height」
- 「&」 before the variables

specifier	detials
%d	decimal integer
%f	Decimal floating point
%lf	Decimal double floating point
%c	character

Four rules of arithmetic

- Arithmetic Operators

Operation	Operator
addition	+
subtraction	-
multiplication	*
division	/
modulus	%

(Integer division truncates any fractional part)

(Example. 10 % 3 → 1)

- Precedence: + - -> * / ->parenthesis

  例) 1 + 2 * 3 → 7

  (1 + 2) * 3 → 9

- the calculation between integer and real number is looked on as the calculation among integers

  例) 175 / 100 → 1 (Integer division truncates any fractional part)

  175 / 100.0 → 1.75 (real number(175)dicided by real number(100.0))

If-Else

if ～ else

```
if ( expression) {
    statement1;
    statement2;
    ...
    statementm;
} else {
    statementm+1;
    statementm+2;
    ...
    statementn;
}
```

if the expression is true;
statement1, ... statementm
will be executed, otherwise,
statementm+1, ...statementn
will be executed.

•the part after「else」can be omitted

While

- Loop- While

```
while ( expression) {
    statement1;
    statement2;
    ...
    statementn;
}
```

If the expression is true,

statement1, statement2, … statementn

will be executed.

The deatils of expression
are avalaible in the 4th class

for

- a method to define a loop as while.

```
for ( initialization_expression;loop_condition;increment_expression) {
    statement1;
    statement2;
     …
    statementn;
}
```

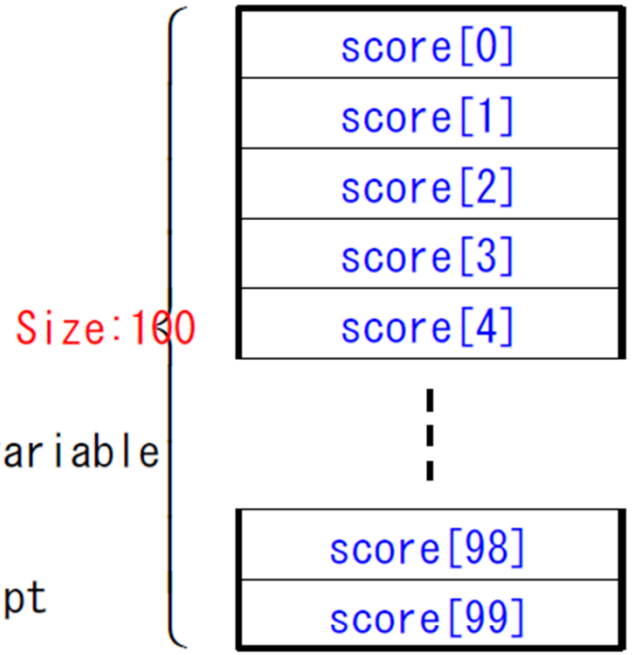
- initialization_expression is executed before execution of the loop starts.
- The execution of the loop continues until the loop_condition is false.
- The increment_expression is executed at the end of each loop iteration.

Array

- `int score[100];`

  type — number of size

- score[0]...score[99]: a block of 100 consecutive elements can be used.
  (score[100]is not avalaible)



- Each element can be used as an int- variable
- The number within []is called subscript
- The subscript can be used as a variable

```
int score[100];

score[10] = 75;
```

=

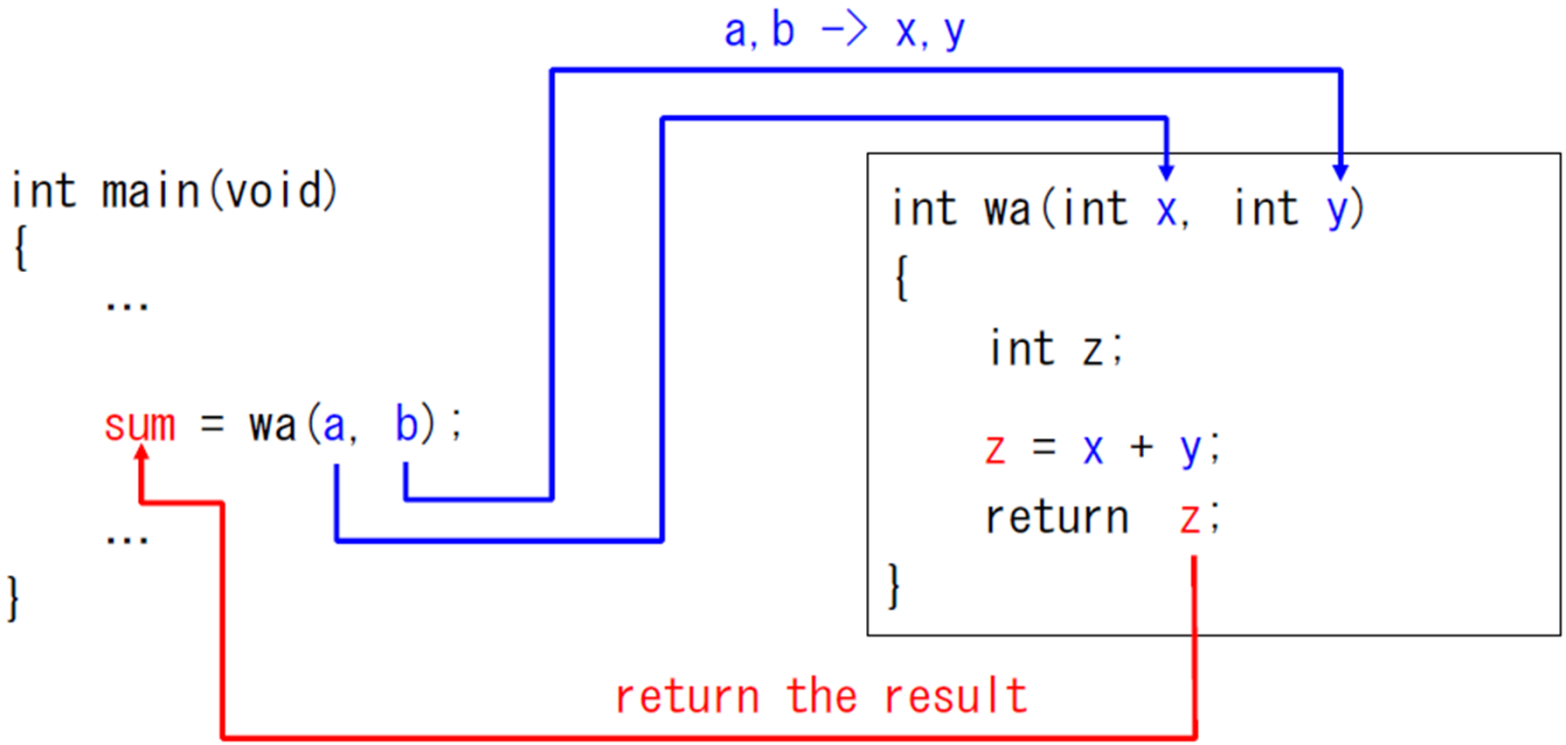
```
int score[100];
int count;

count = 10;
score[count] = 75;
```

Functions Definition

when sample.cis executed

- In C programming, the execution of program is started from main()



Pointers

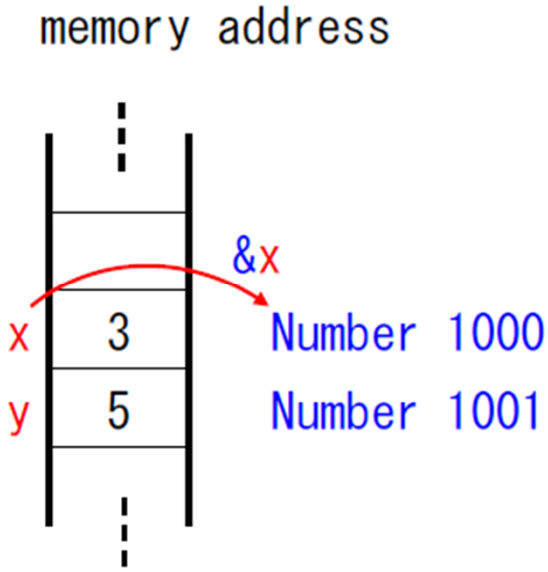
To get the address of variables ....

For examples,

```
int x;
```

by writing &x
we can get the address of variable X.

- this address is called 「x's pointer」.
- & is called address operator



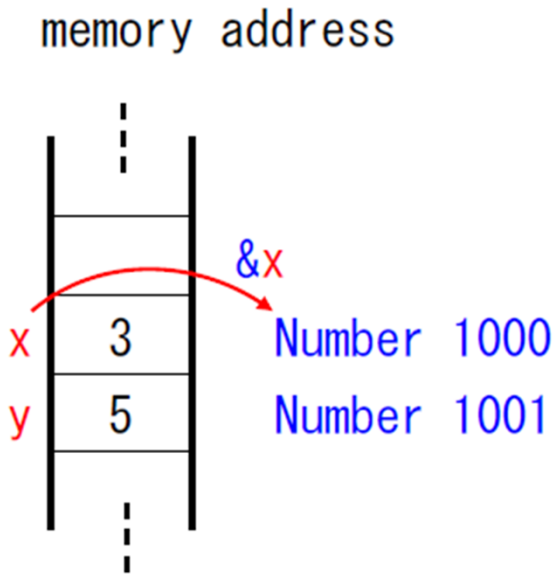
Pointers

To get the address of variables ....

- To declare a pointer

```
int *x_p;
```

x_p will be a pointer to show
the address of a variable (int type)



- In this case,

```
x_p = &x;
```

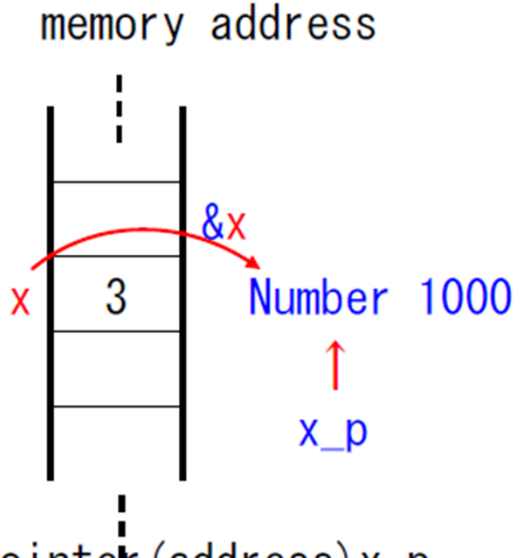
← x_p stores the address of x

means that pointer x_p will store the address of x
⇒that is to say: 「x_p points to x」

Pointers

- the image of the following operation can be shown in the right figure

```
int x = 3;
int *x_p;
x_p = &x;
```



- by using * operator, we can get the value of variable which is stored in pointer (address) x-p

- * is called indirection operator.

pointer3.c

```
#include <stdio.h>

int main(void)
{
    int a = 123, b;
    int *p;

    p = &a;
    b = *p;
    printf("a = %d, b = %d, *p = %d¥n", a, b, *p);

    a = 200;
    b = 300;
    printf("a = %d, b = %d, *p = %d¥n", a, b, *p);

    p = &b;
    printf("a = %d, b = %d, *p = %d¥n", a, b, *p);

    return 0;
}
```