Basic Computer Programming

Lecture 1

Electrical & Electronics Engineering

Chung-Ang University

Contents

- Understand what a program is.

- Understand why programming languages are needed.

- Understand what the algorithm is.

- Understand the development process of the program.

- Successfully install the Visual Studio.

The program we are going to make in this chapter

- Hello World!" is the first program that many people make when learning programming.

Microsoft Visual Studio 디버그 콘솔

```
Hello World!
```

"Hello, world. My first look at my forever home. "
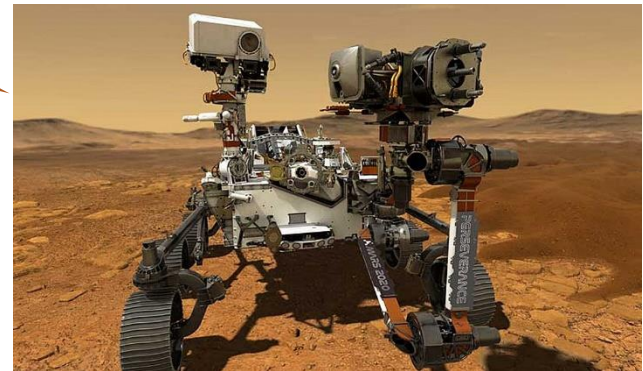
What is a program?

- What's inside the program?

프로그램

```
move()
move()
turn_left()
move()
...
```
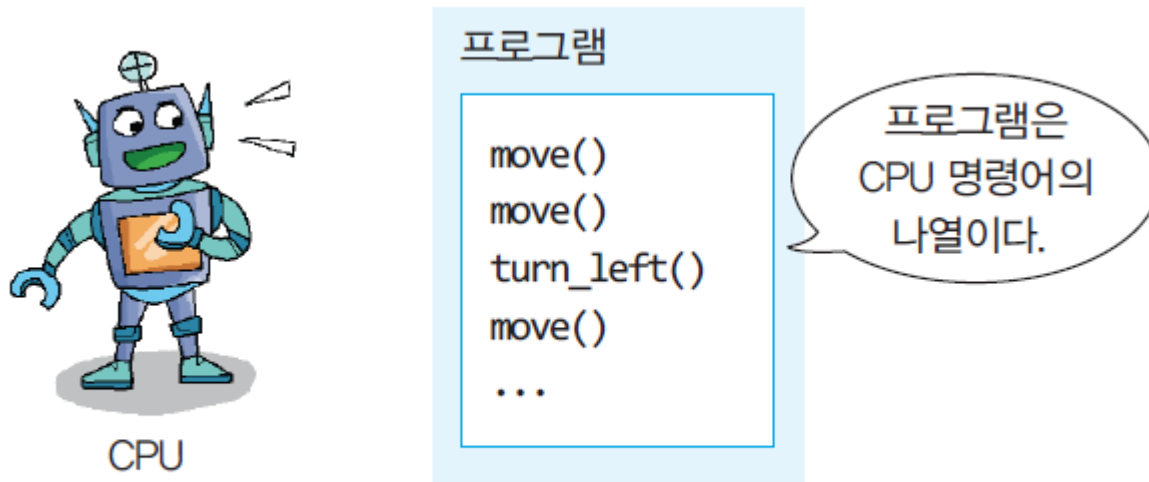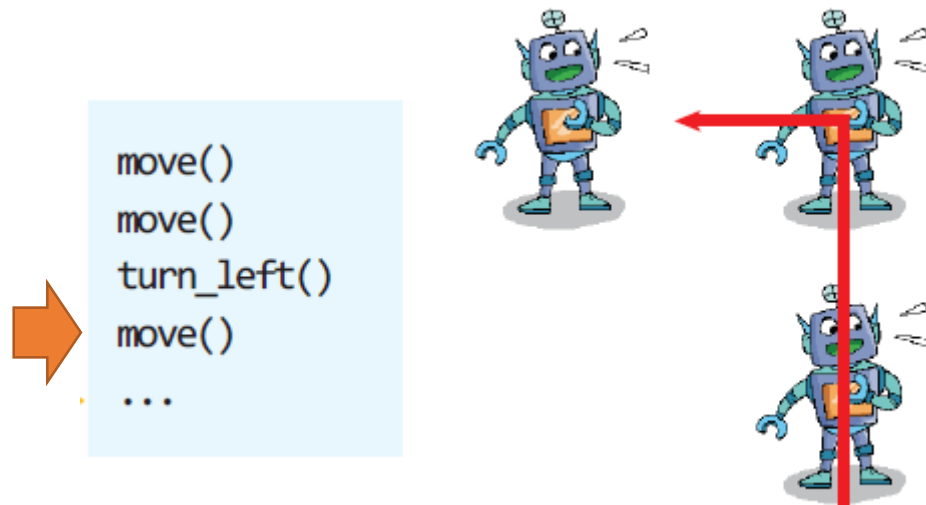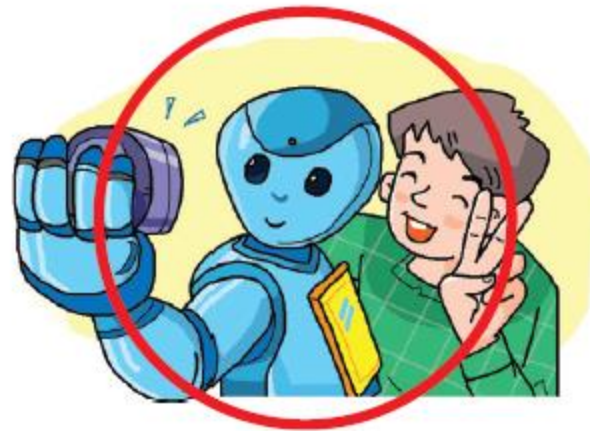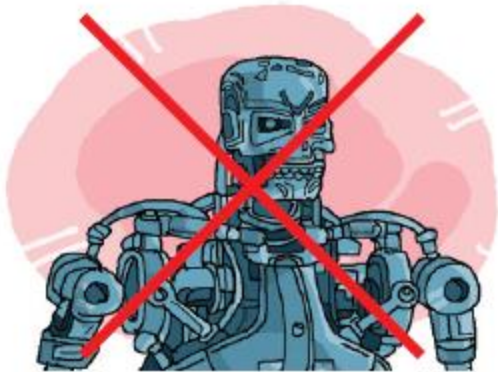
프로그램은 CPU 명령어의 나열이다.

CPU

그림 1.1 프로그램은 작업 지시서와 같다.

What is the command?

- If it is a robot-moving program, instructions for moving the robot are listed in the program.

```
move()
move()
turn_left()
move()
...
```
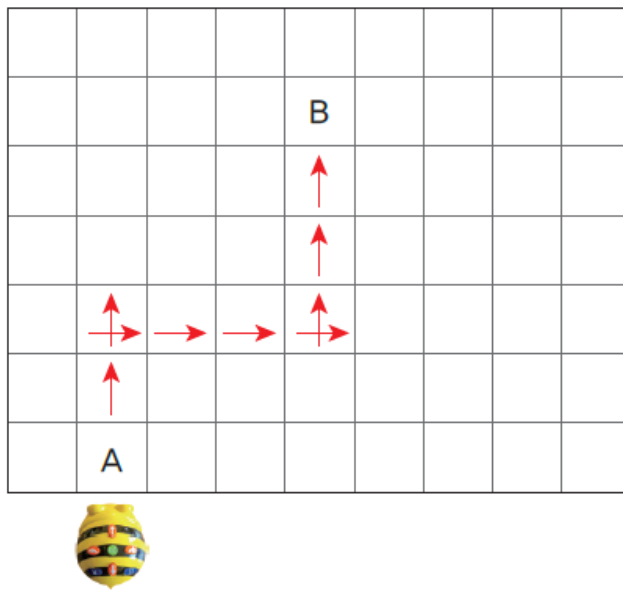
Computer and human

- Computers only act as instructed by programmers unless they are strong artificial intelligence.
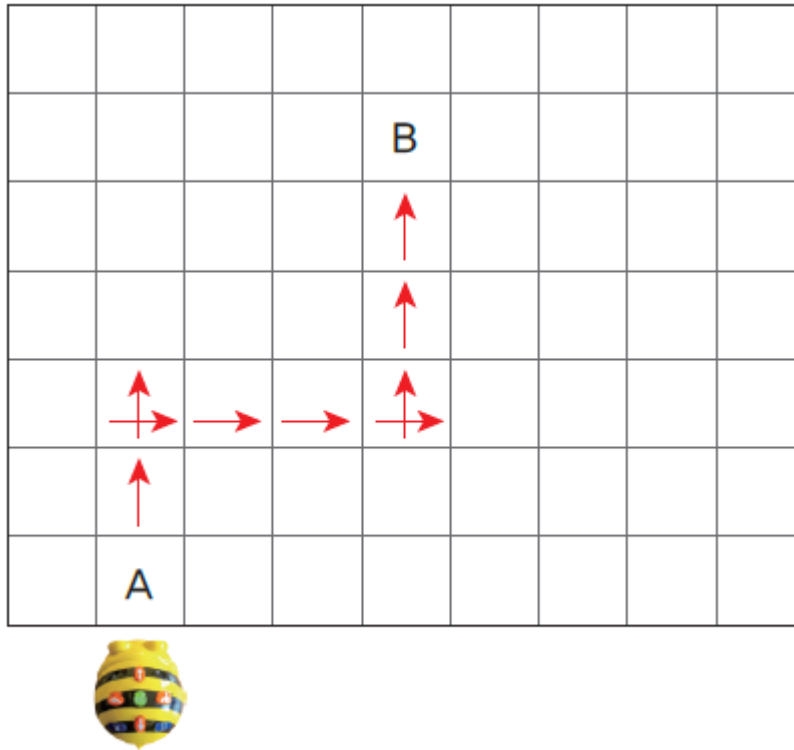
Lab: Moving the robot

- In what order should we input the instructions to move the bee-bot from point A to point B?

SoI: Move the robot

한 칸 전진

한 칸 전진

오른쪽으로 90도 회전

한 칸 전진

한 칸 전진

한 칸 전진

왼쪽으로 90도 회전

한 칸 전진

한 칸 전진

A program for the bee-bot

Commands for actual computers

- What are some of the instructions on the computer we use?

- Instructions provided by Intel's x86 CPU include ADD, SUB, MOV, IMUL, etc. (very many). ADD is an addition operation, SUB is a subtraction operation, MOV is a data movement operation, and IMUL is a multiplication operation. The main actions of the CPU are calculation and data movement.
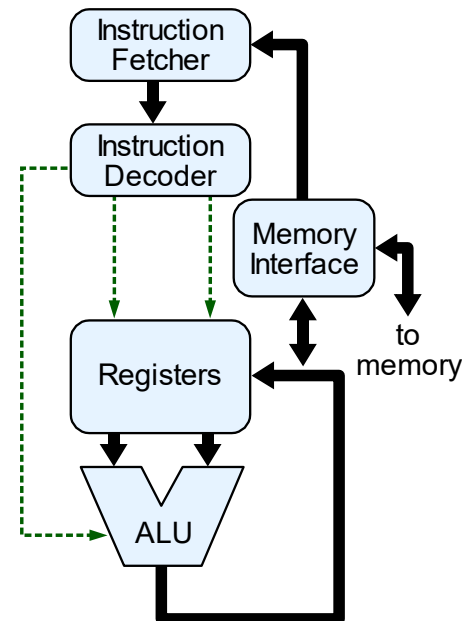
Language that computers understand.

- If you instruct your work in Korean or English, the computer will not be able to understand at all.
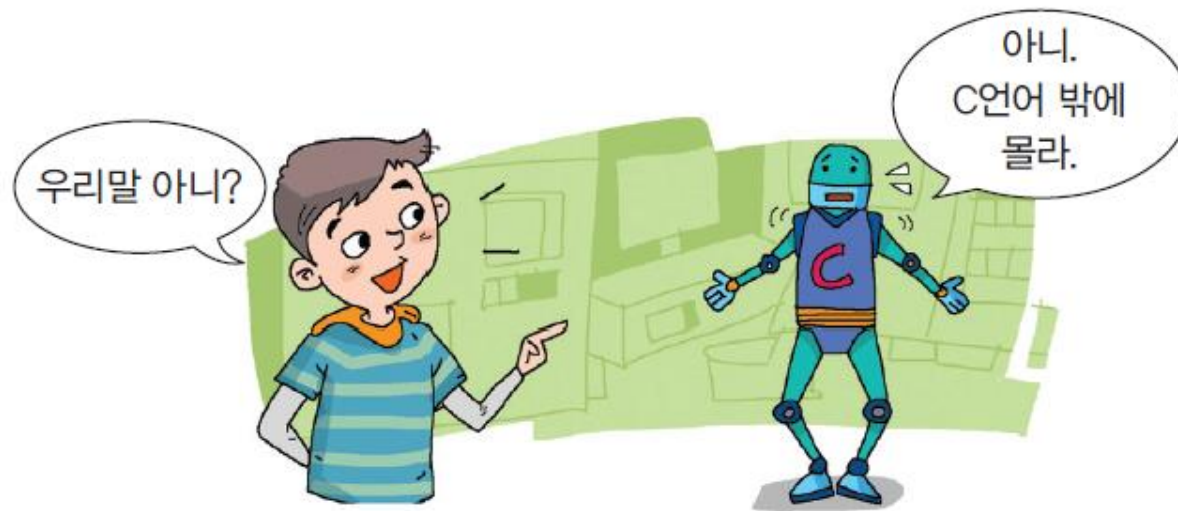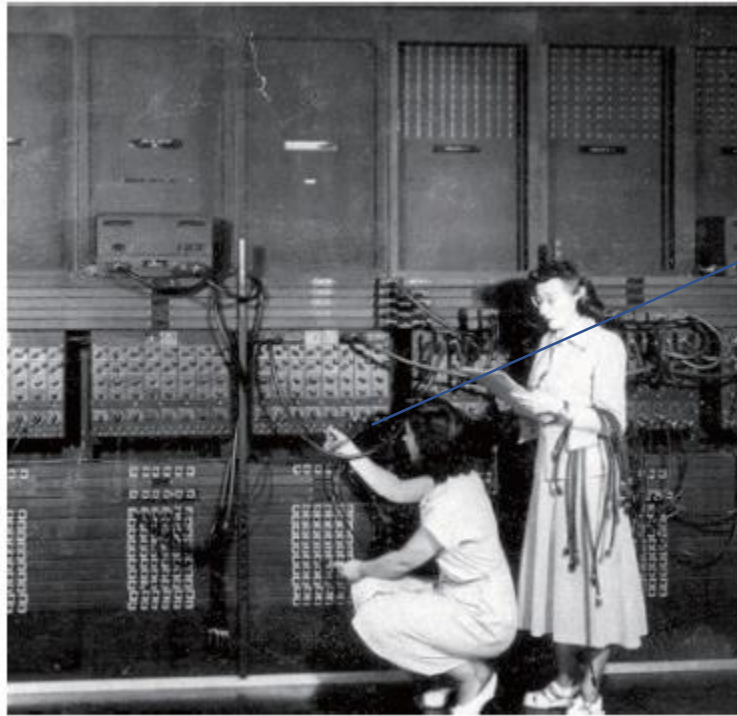

우리말 아니?

아니.
C언어 밖에
몰라.

그림 1.2 컴퓨터는 한글로 된 작업 지시서는 이해하지 못하는 반면 기계어로 된 작업 지시서는 이해할 수 있다.
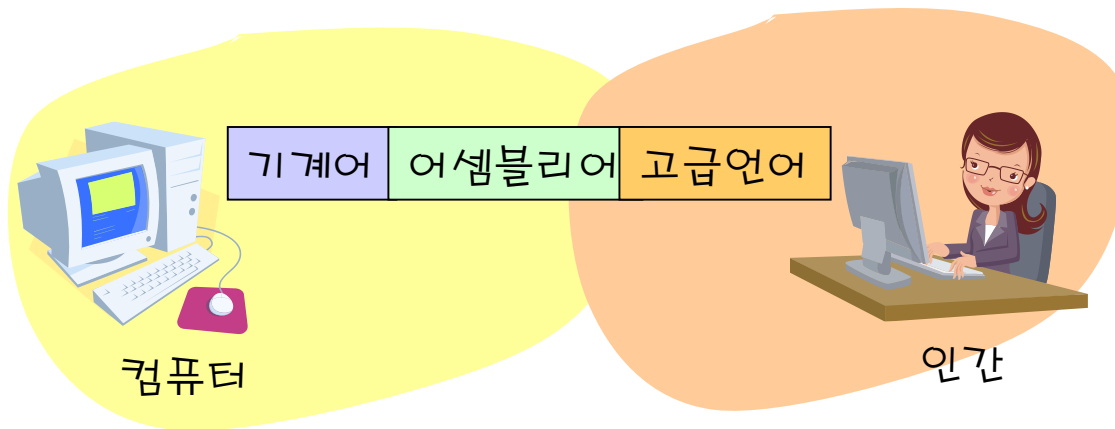
Language that computers understand.

- It is a binary machine language such as "00110111000101010...", consisting of 0 and 1.

It is programming by connecting wires.

Classification of programming languages.

- Machine language
- Assembly language
- High-level language

The role of a compiler

```
#include <stdio.h>
int main(void){
    printf("Hello World!");
    return 0;
}
```

01011101010010010101010101
11110101010101000100001010
00101110101010010010101010
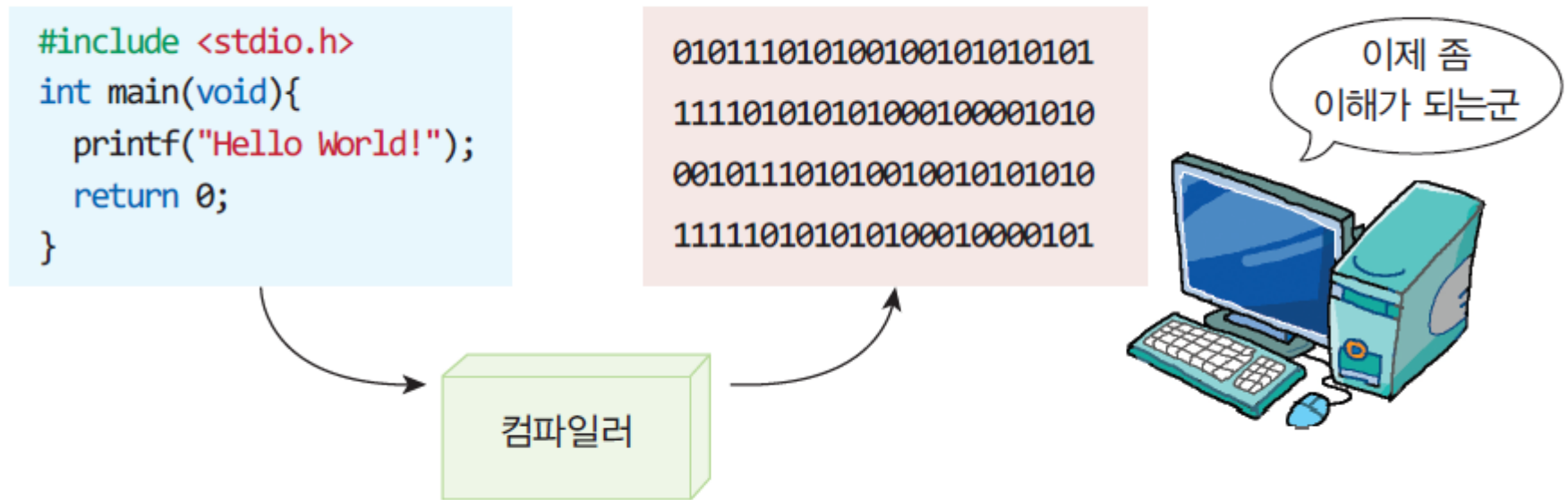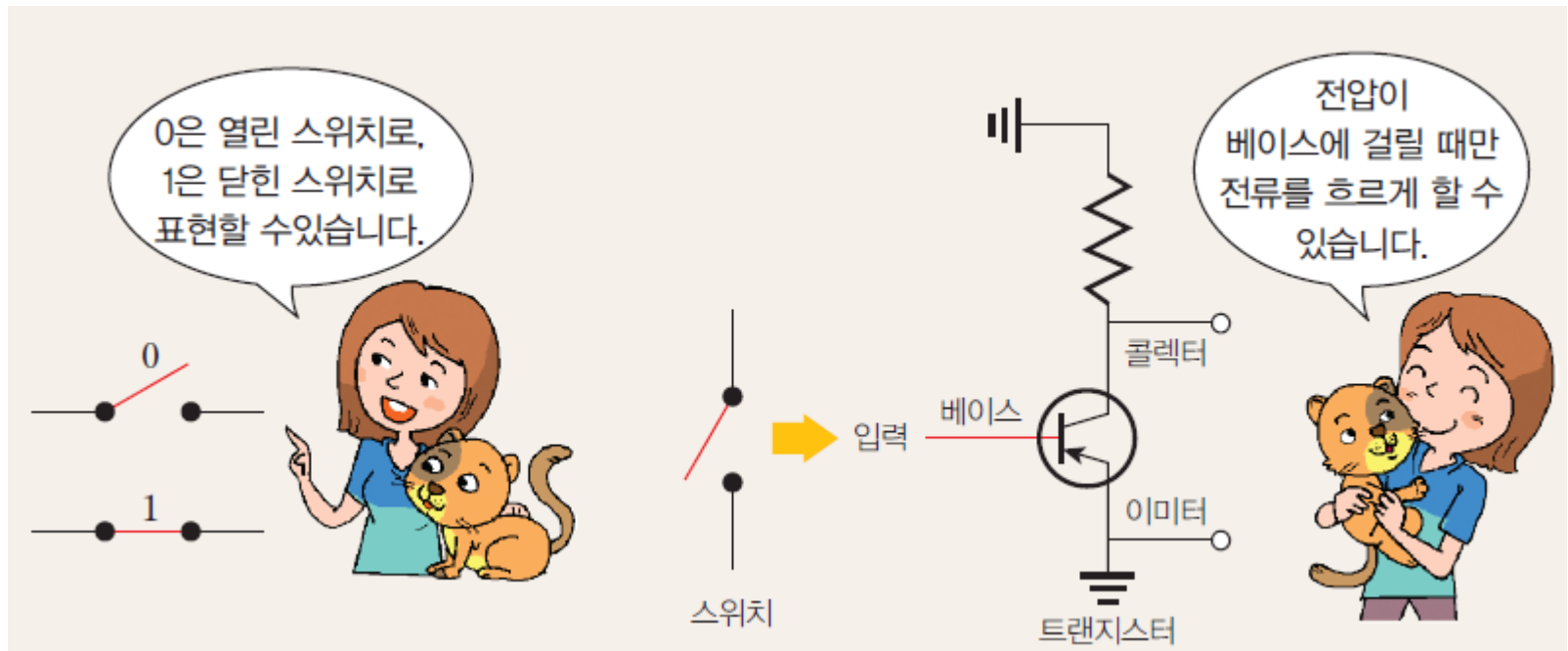11111010101010100010000101

컴파일러

이제 좀
이해가 되는군

그림 1.4 컴파일러는 프로그램을 기계어로 변환한다.

Why does a computer use binary?

- Binary numbers are easy to implement in hardware. Inside the computer, everything is expressed and processed in binary form.

Interim check

1. 컴퓨터가 바로 이해할 수 있는 언어는 _____ 이다.
2. 컴파일러가 하는 일은 무엇인가?
3. 컴퓨터가 내부적으로 사용하는 진법은 _____진법이다.

C Language

- Developed by Dennis Ritchie of AT&T in the early 1970s.
- B language ->C language.
- It's created because it's necessary to develop a Unix operating system.
- It was developed as a professional language.

The scene where Ken Thomson and Dennis Ritchie receive the National Medical of Technology Award from President Clinton.

Characteristics of C language.

간결하다

효율적이다

C language

배우기는 어렵다

이식성이 뛰어나다

저수준과 고수준이 모두 가능하다

그림 1.6 C언어의 특징

Characteristics of C language.

- It's concise.
- It's efficient.
- The C language can be low-level programming that directly controls hardware and high-level programming.
- The C language has excellent portability.
- It is difficult for beginners to learn.

C language is fast.

- C language is the fastest of all programming languages.
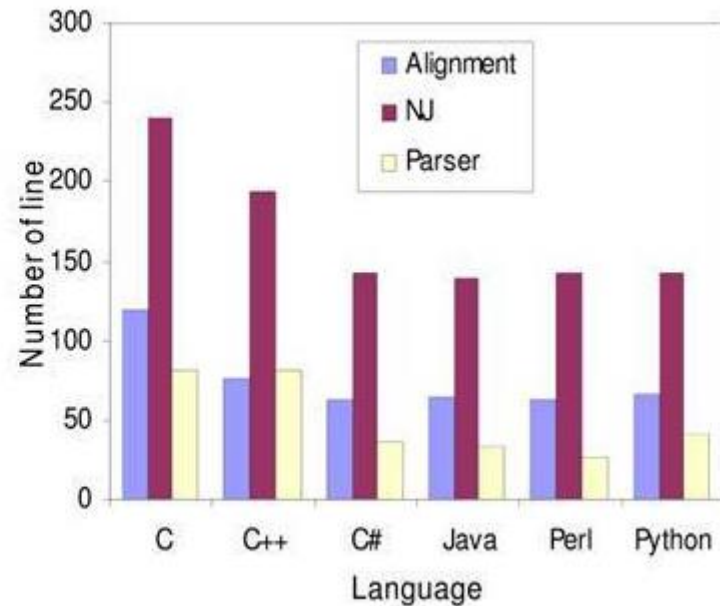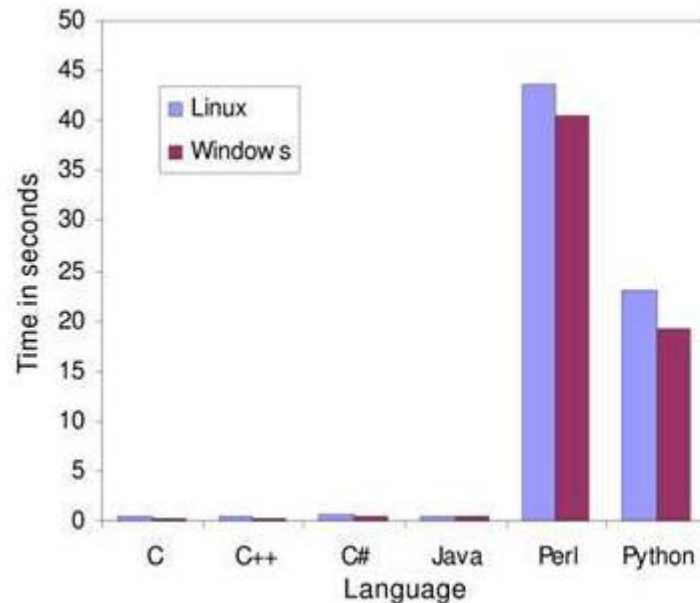
Algorithm

Q) Can anyone cook if they only learn how to use the oven and have food ingredients?

A) You need to know how to cook.

그림 1.7 오븐(컴퓨터)이 준비되고 오븐을 작동하는 방법(프로그래밍 언어)을 안다고 하더라도 요리를 하는 절차(알고리즘)를 모르면 요리(프로그램)를 만들 수 없다.

Algorithm

- The step-by-step procedure that a computer must perform to solve a problem is called an algorithm.
- (e.g.) Finding the phone number of his friend "Park Chulsoo" in the phone book.

The bread-making algorithm.

① Prepare an empty bowl.
② Stir the yeast in flour and milk.
③ Add butter, sugar, and eggs and mix.
④ Put it in a warm place and ferment it.
⑤ Bake in an oven at 170-180 degrees Celsius.

그림 1.8 알고리즘은 요리법과 같다.

Algorithm skills.

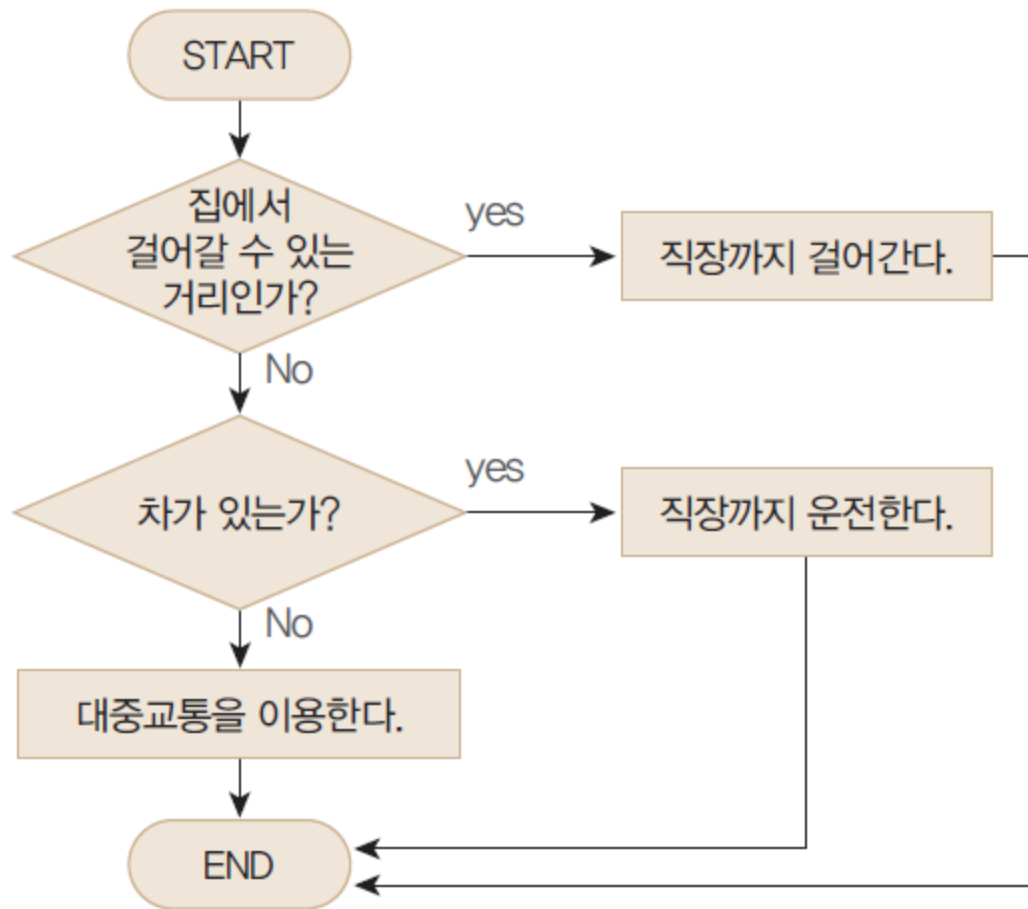- Flow chart: A method of representing a logical order or work order in a program as a picture.

수행의 시작/종료

처리

판단

연결자(흐름도가 너무 커서 한페이지에 나타낼수 없을때 어디로 가라는 표시에 사용)

입출력
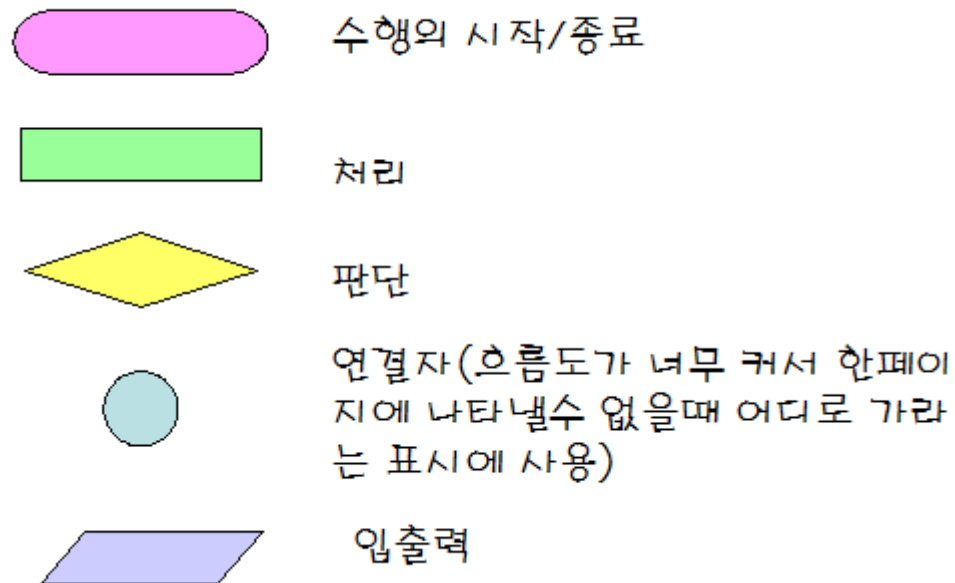
Example of the flow chart

그림 1.9 순서도의 예

Interim check

중간점검

1. 친구에게 전화를 거는 알고리즘을 순서도로 만들어보라.
2. 세탁기로 세탁하는 알고리즘을 순서도로 만들어보라.

Program development process

① 텍스트 에디터로 C언어 프로그램을 작성하여 파일로 저장한다.

텍스트 에디터로 작성된 프로그램을 소스 프로그램이라고 하고 이것을 확장자가 ".c"인 파일로 저장한 것을 소스 파일(source file)이라고 한다.

문장의 끝에 ;을 붙여야지

hello.c

② 소스 파일을 컴파일한다.

컴파일러(compiler)는 소스 파일을 분석하여 컴퓨터에서 실행이 가능하도록 기계어로 변환한다. 컴파일러는 소스 파일의 문장을 분석하여 문법에 맞도록 작성되었는지를 체크한다. 만약 오류가 발견되면 사용자에게 오류를 통보하고 프로그래머는 소스 작성 단계로 되돌아가서 소스 파일을 수정하여야 한다.

```
#include
<stdio.h>
int main()
{
printf("Hello")
;
retutn 0;
}
```

100010101010101
000100101010111
011111100110000
001011001101010

010111011100011
011111001111000
000110011110101
010010010101000

소스 코드   실행 가능한 코드

hello.exe

③ 프로그램을 실행한다.

컴파일이 성공적으로 수행되면 실행 가능한 파일이 만들어진다. 예를 들어서 소스 파일이 hello.c였다면 hello.exe 파일이 생성된다. 이 실행 파일을 가리키는 아이콘을 더블클릭하거나 통합 개발 환경 안에서 실행 메뉴를 선택하면 프로그램이 실행된다.

실행하려면 [실행] 메뉴를 선택하면 돼

Integrated development environment.

- Integrated development environment (IDE):
- Editor + Compiler + Debugger.

통합 개발 환경

통합 개발 환경은 에디터, 컴파일러, 디버거를 하나로 합친 프로그램이다.

Visual Studio

- Microsoft's products.
- Windows-based applications can be produced in almost any type of application.
- The version we're going to use: Visual Studio 2019.
- https://visualstudio.microsoft.com/ko/vs/older-downloads/

Visual studio version.

- The Visual Studio Community version is a fully scalable, free tool for beginners.

  The Professional Studio Professional is a professional developer tool and service for individual developers or small teams.

  Visual Studio Enterprise develops any size or complex project, including advanced testing and DevOps, with advanced features for the team

Installation of a visual studio
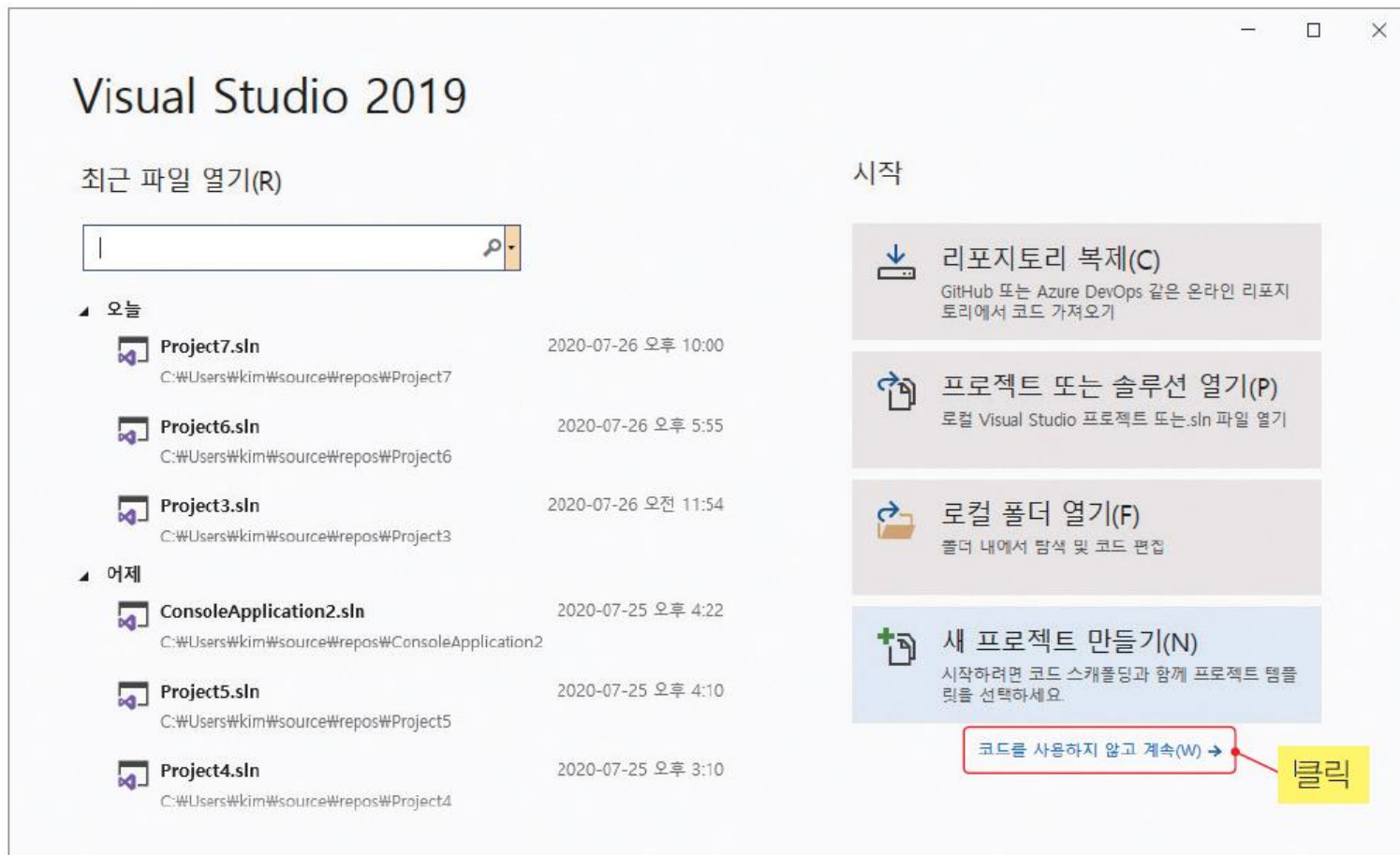
Installation of a visual studio

Installation of a visual studio
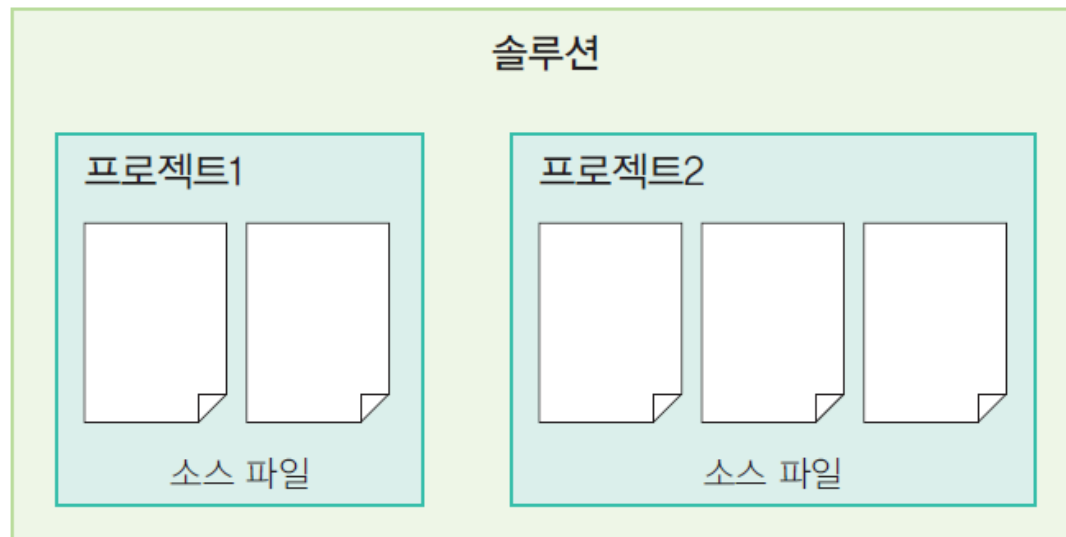
Execution of the visual studio
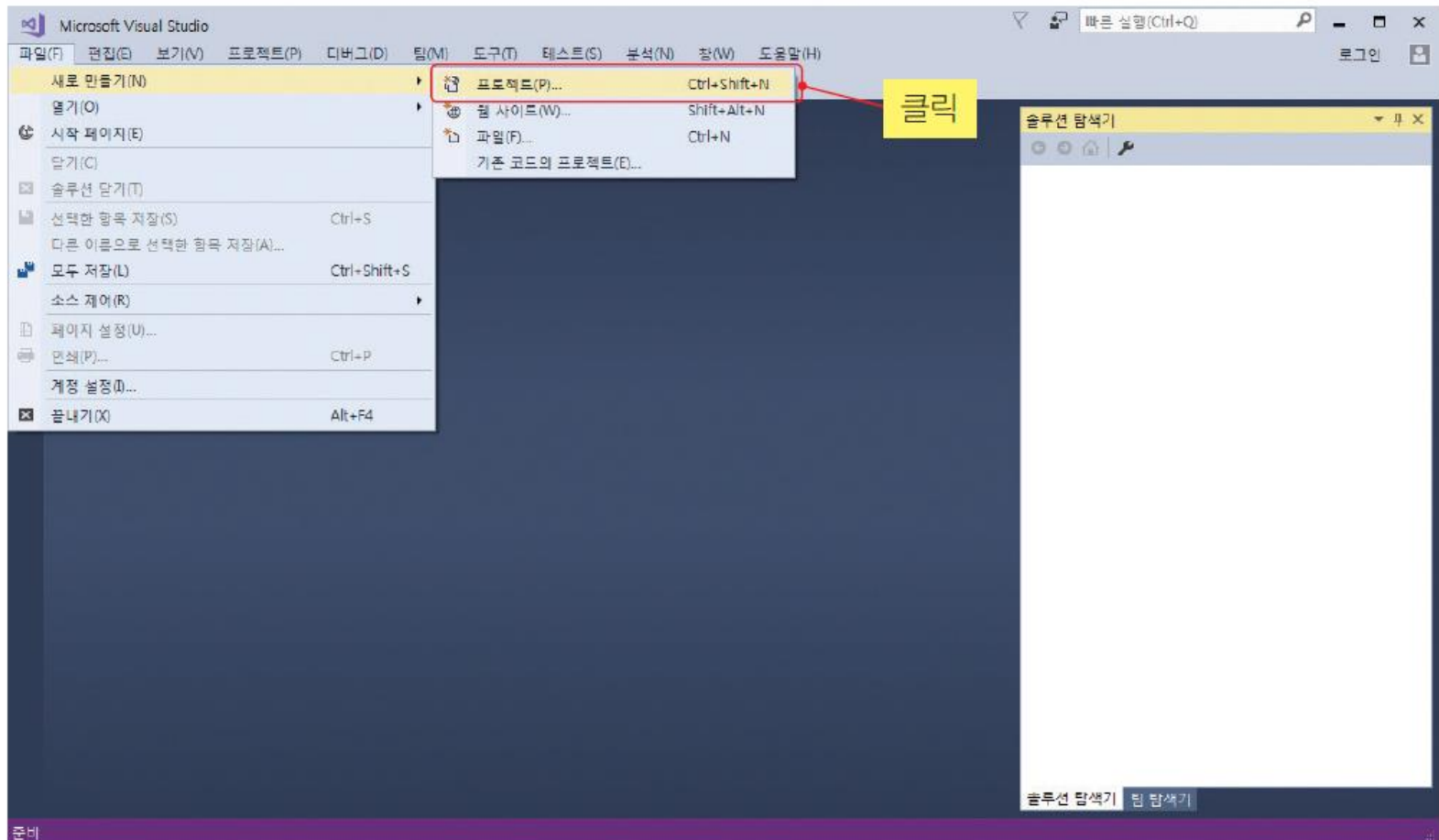
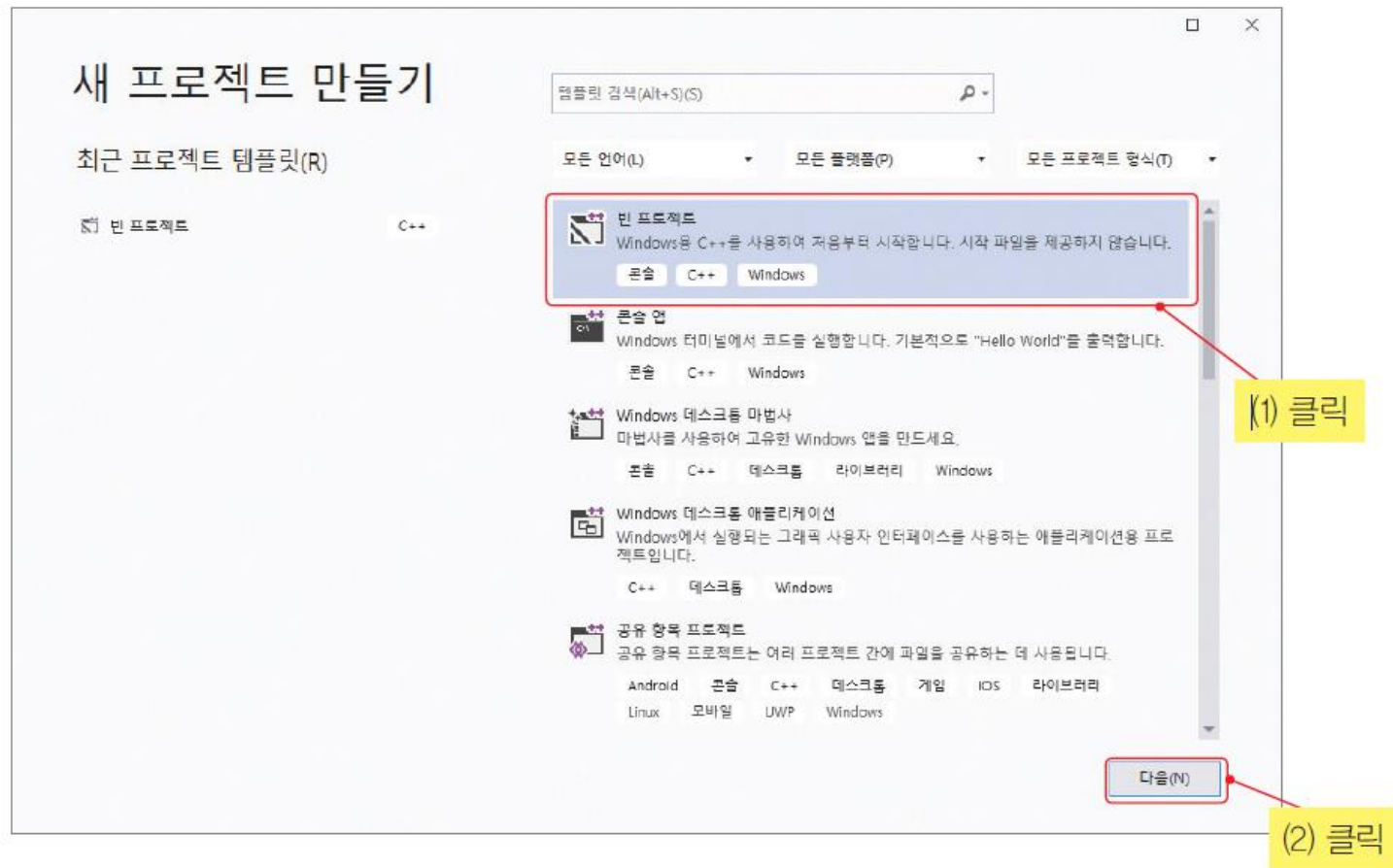# Execution of the visual studio

Solutions and projects

- Solution; a group of projects for creating one application.

- Project: a group of files required to create one executable file

Create a new project by selecting the [File]→[New]→[Project] menu.

Select "Empty Project" in the dialog box.

Enter the name of the project
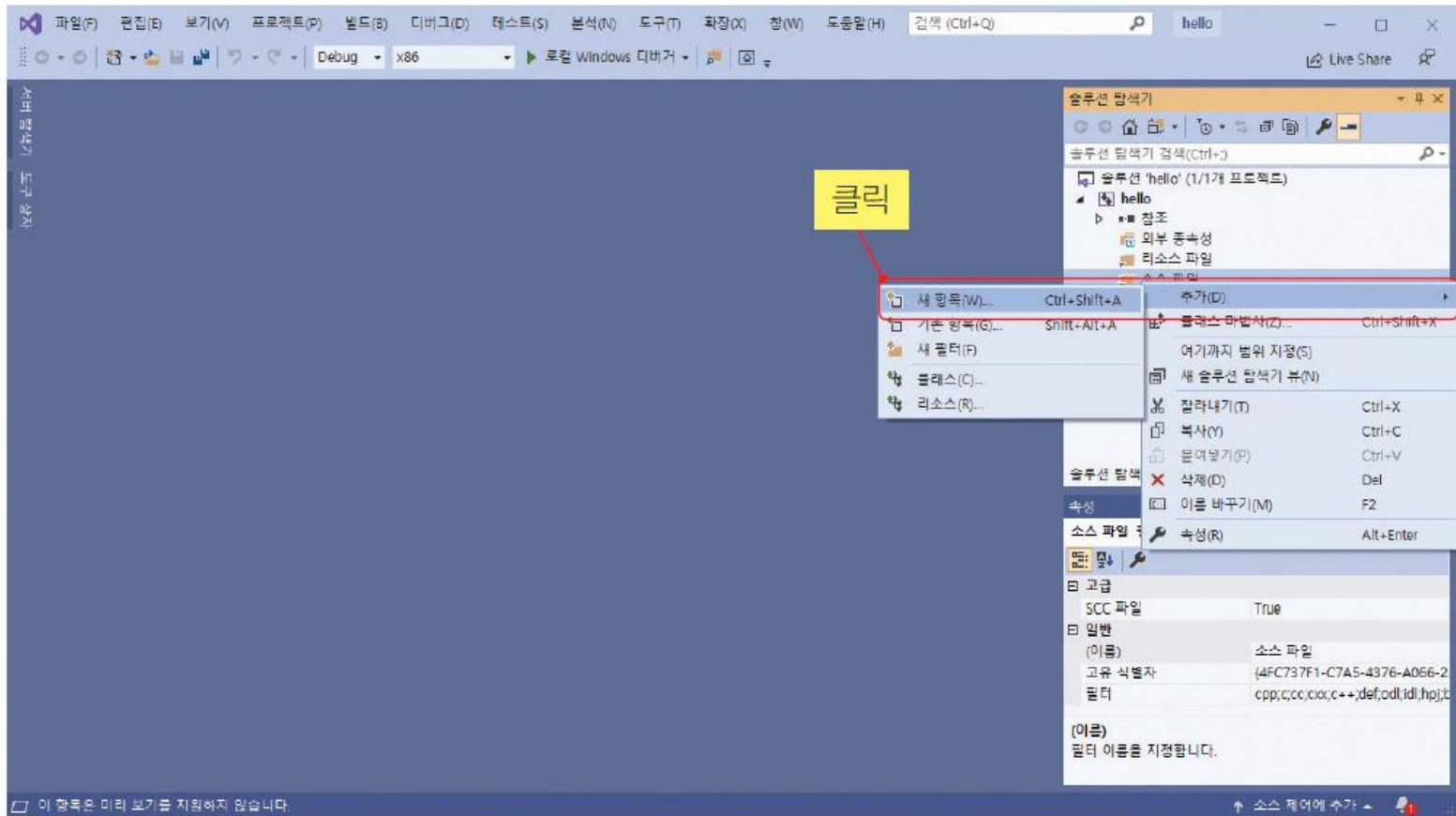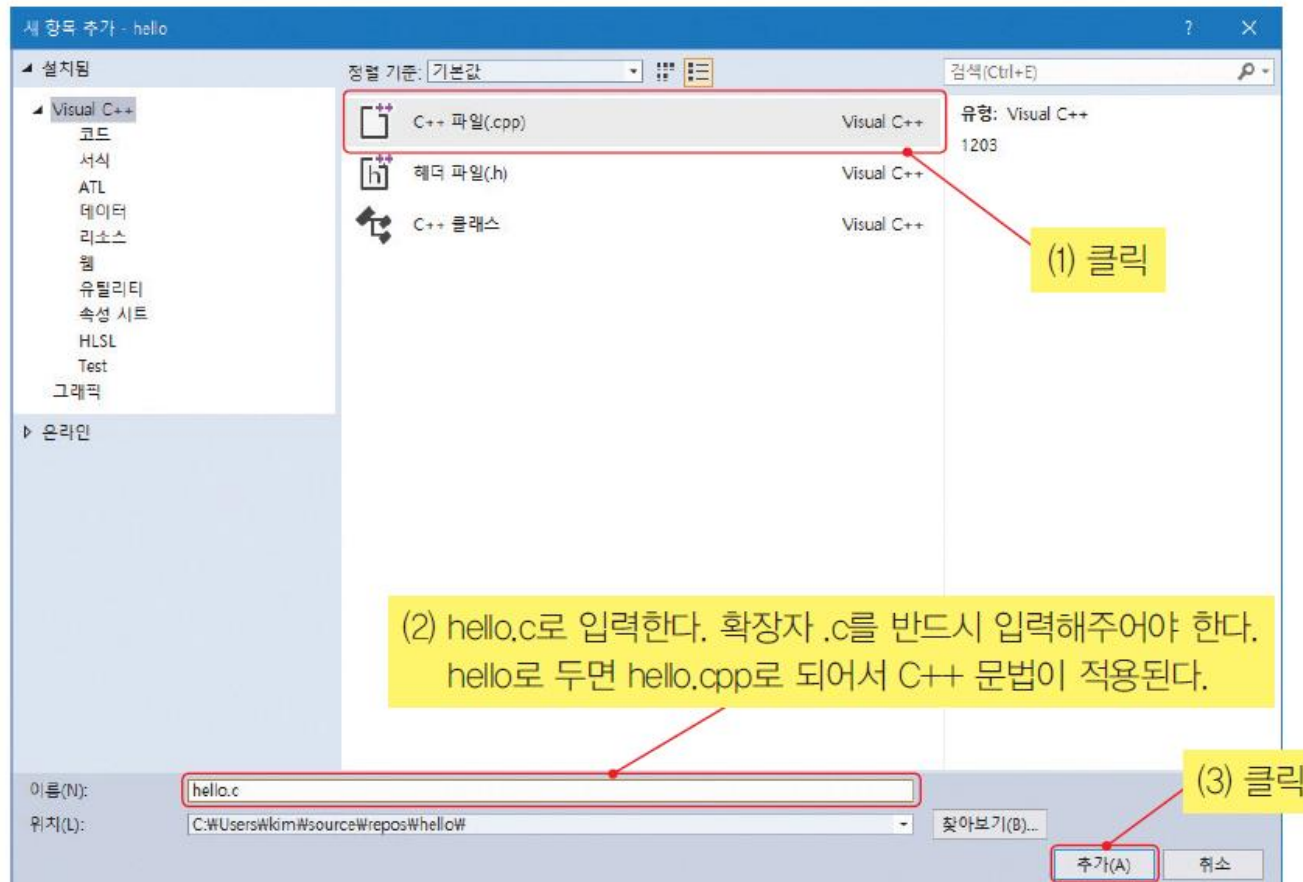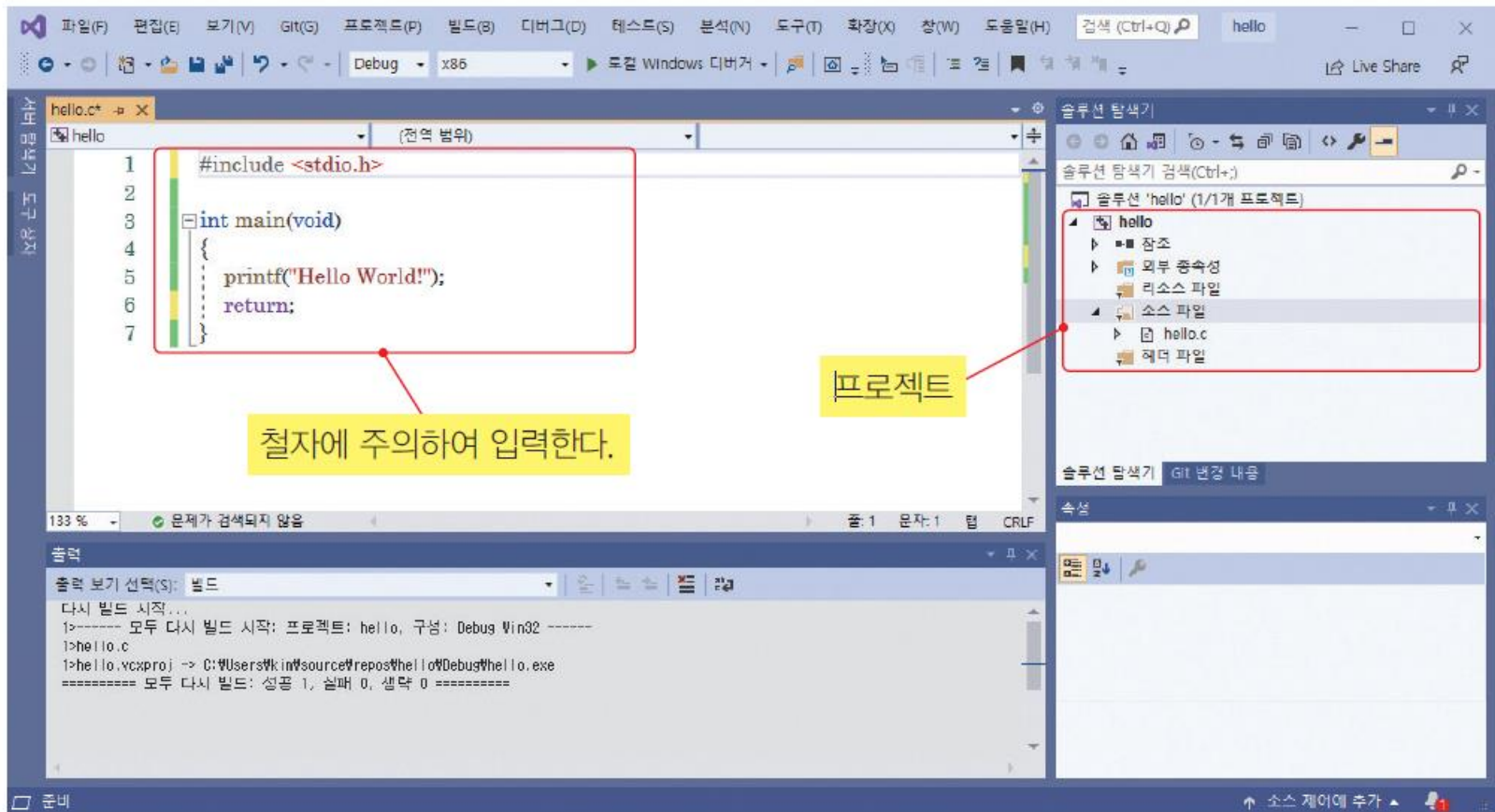
Create a project
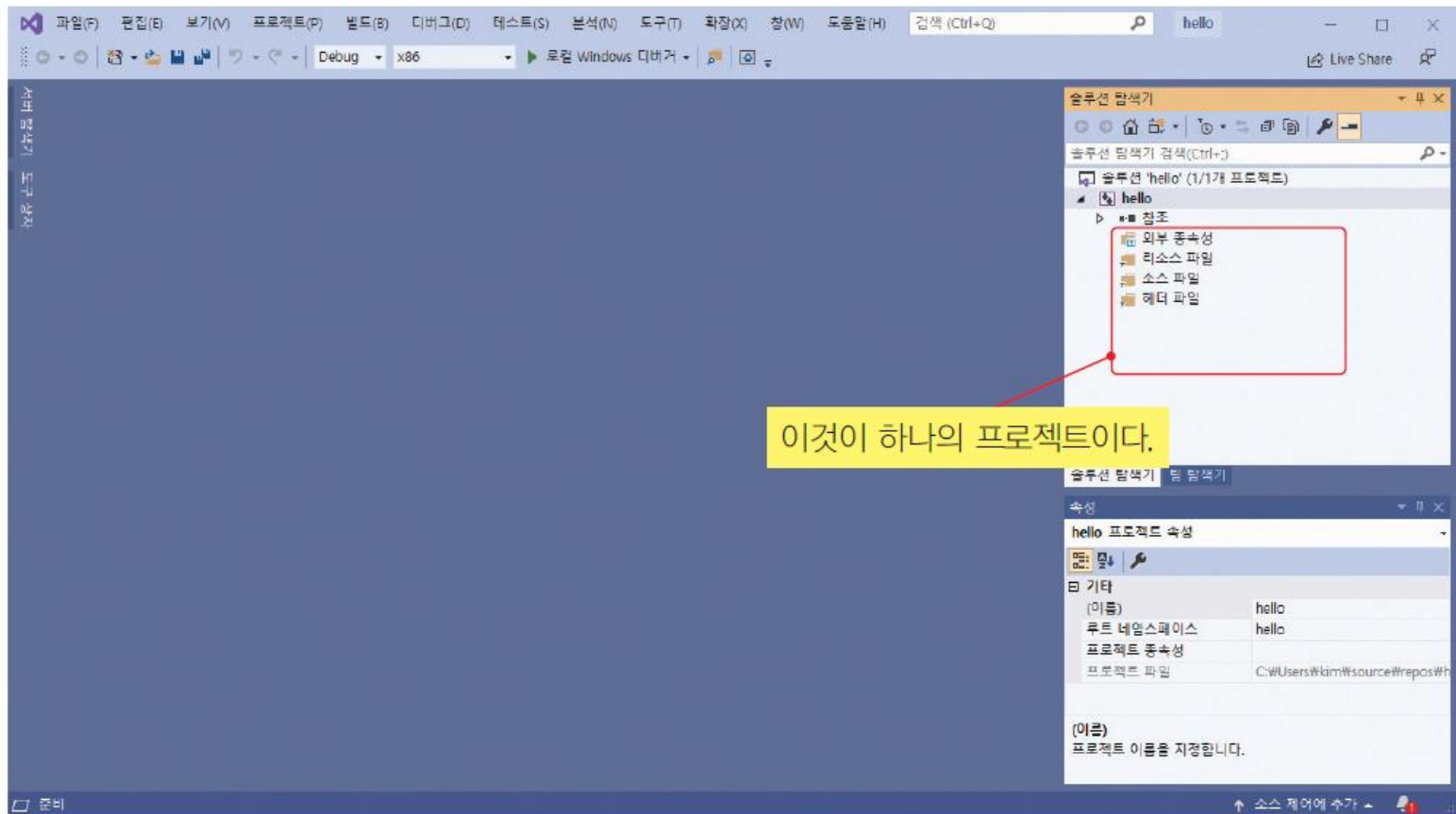
Create a source file

Add a source file

Enter the source code

Enter the source code

include나 stdio는 붙여쓴다.

기호는 정확하게 입력

```
#include <stdio.h>

int main(void)
{
    printf("Hello World!");
    return 0;
}
```

들여쓴다.

문장의 끝에는 세미콜론

그림 1.10 소스 코드를 위와 같이 입력하여야 한다.

한 글자도 틀리면 안됨!

Precautions for entering the source code

- C distinguishes upper and lower case letters. Therefore, upper and lower case letters should be accurately distinguished and entered. In other words, main and Main are different from each other.

- When entering a given source code, be careful not to misspell even one letter. It is impossible to implement even if one symbol is wrong. What should be called stdio.h should not be entered as stdio,h. Computers are incredibly simple.

- Each instruction statement in the source code must end with a semicolon (;) symbol. ; Symbols act as periods.

- There may be a space between each sentence and the sentence. Also, sentences can be written in. However, let's try to enter it as given.
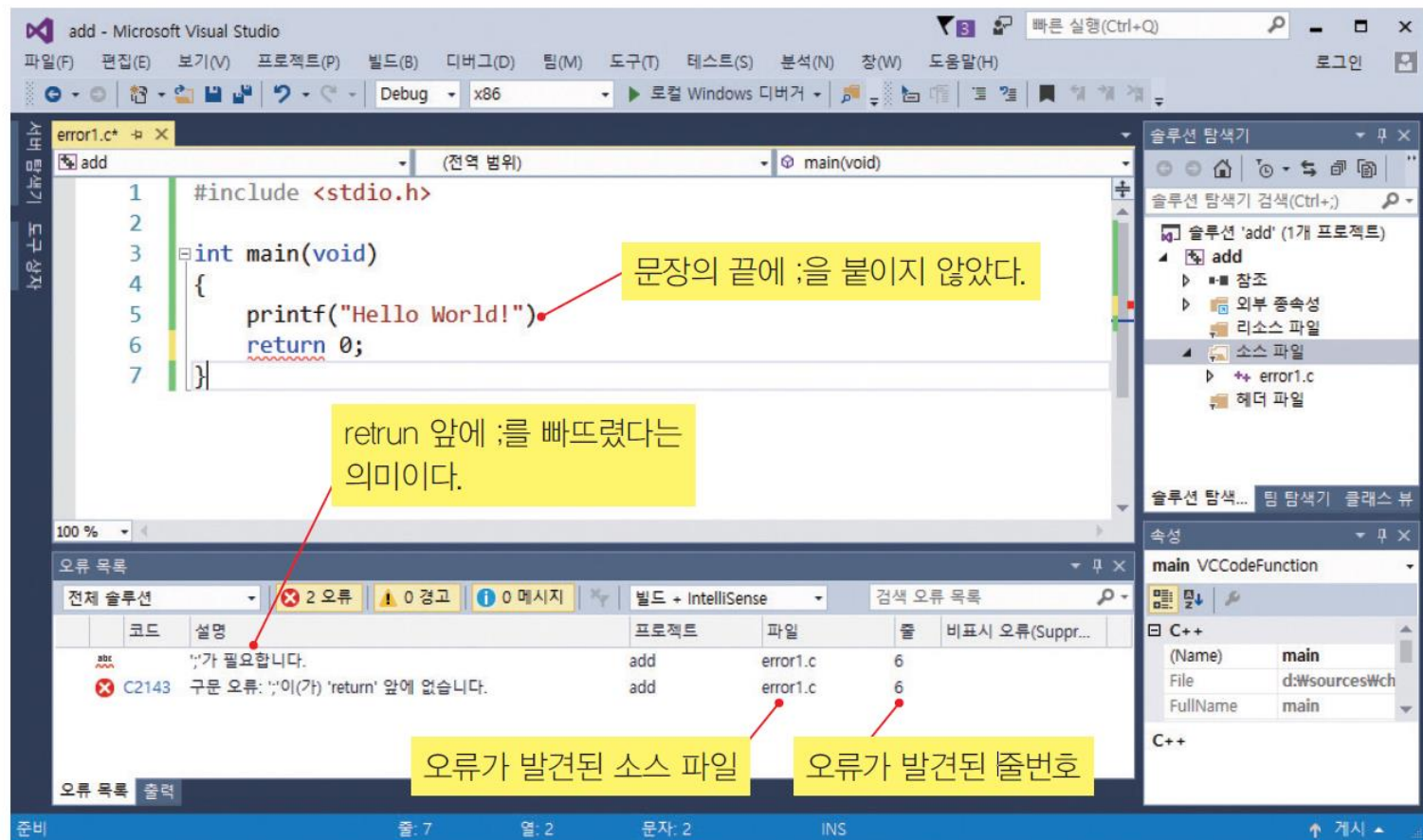
Compile and link.
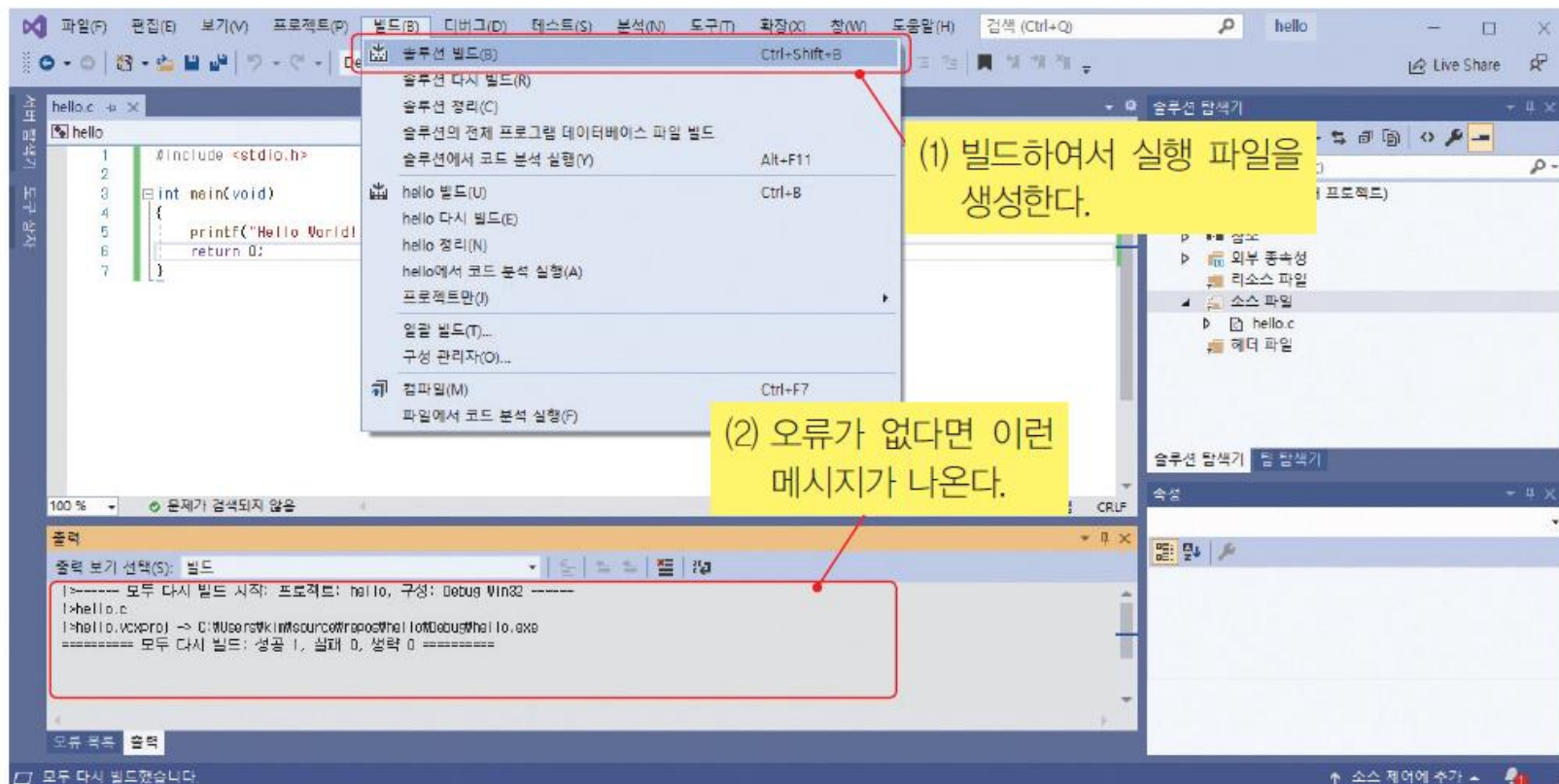
Program execution
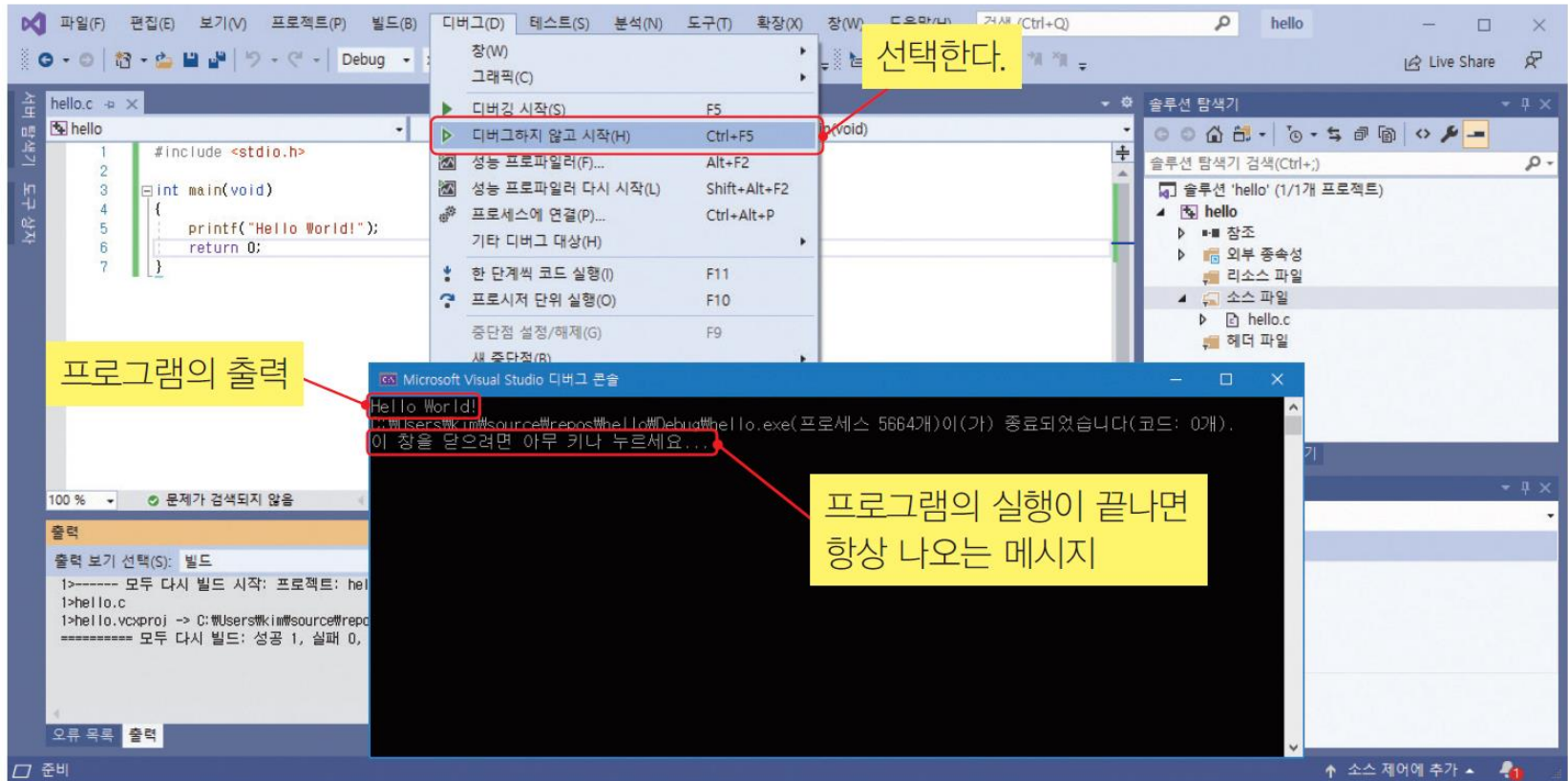
A common error

The program that we wrote

```c
/* 첫번째 프로그램*/
#include <stdio.h>

int main(void)
{
  printf("Hello World!");
  return 0;
}
```

Hello World!

Interim check

1. What is the menu that creates a new project and adds a source file to the project?

2. What is the menu that compiles and executes source files belonging to the project?

3. Does C language distinguish between uppercase and lowercase letters

Q & A