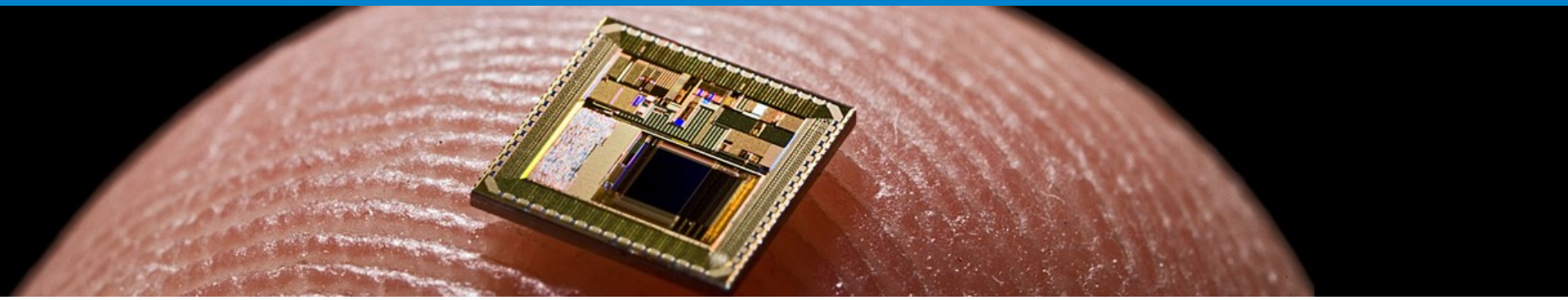
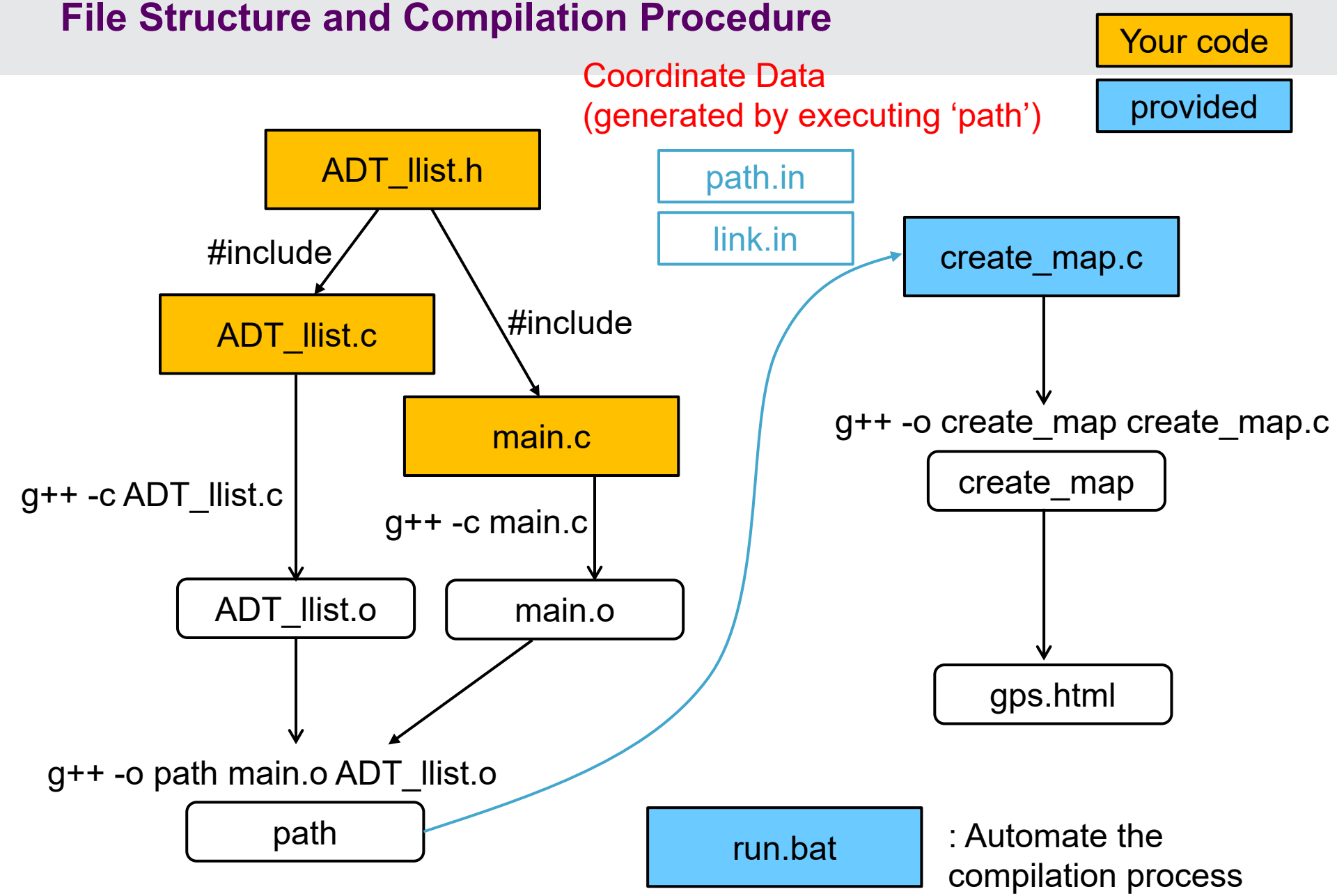
Data Structure
HW2
- Sorting with linked list



File Structure and Compilation Procedure

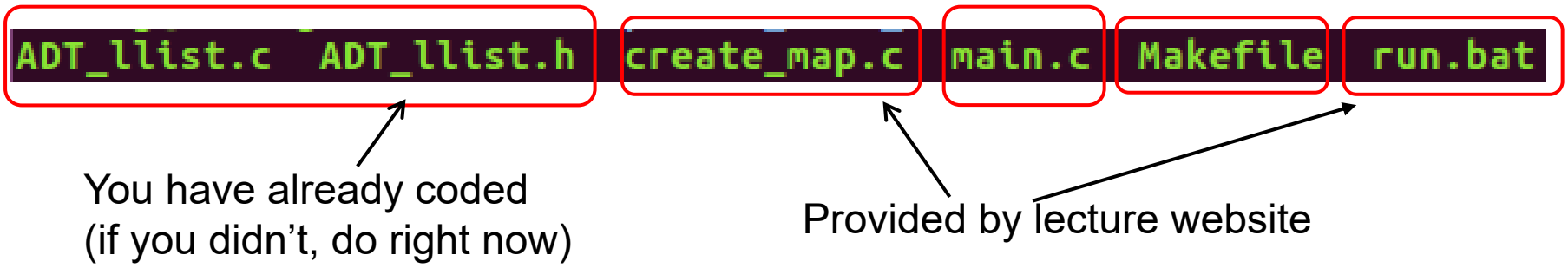


Edit Makefile

```
help:
	@echo "make help"
	@echo "make all"

ADT_llist.o:
	g++ -c

main.o: main.c
	g++ -c main.c

all:  main.o
	g++ -o path main.o
run: all
	./path

clean:
	rm *.o *.in *.swp *.html path create_map
```

Download create_map.c, run.bat

- Download create_map.zip
  - Extract into your project folder (two files are extracted, run.bat create_map.c)
  - After that, enter ‘ls’ command
    - You can see the following in terminal



Default Program (this code is provided, just run)

```c
#include "ADT_llist.h"

//#define SORT 0 //sort

#define D_SIZE 8

int compare1(void* x, void* y) {
    return *((int*)x) - *((int*)y);
}

void print1(void* x)
{
    int* xp = (int*)x;
    printf(" - int data %d\n", *xp);
}

typedef struct point{
    double x;
    double y;
} POINT;

void sort_list(LLIST* list, void* data);

int main() {
    FILE* fnode = fopen("node.in", "w");
    FILE* flink = fopen("link.in", "w");

    LLIST* list = create_list(compare1, print1);
    int i;

    POINT path[D_SIZE] = {
        {35.885663, 128.6142},
        {35.888741, 128.609344},
        {35.887057, 128.610213},
        {35.886988, 128.611832},
        {35.890204, 128.609753},
        {35.892413, 128.609242},
        {35.891764, 128.609924},
        {35.887085, 128.609089},
    };

#ifndef SORT
    for(i = 0; i < D_SIZE; i++) {
        fprintf(fnode, "%lf %lf\n", path[i].x, path[i].y);
    }
    for(i = 0; i < D_SIZE-1; i++) {
        fprintf(flink, "%lf %lf %lf %lf\n", path[i].x, path[i].y, path[i+1].x, path[i+1].y);
    }
#else
```

Role like REVERSE in HW1

Coordinates to display on the google map

Create a file, which is used by create_map.c

KNU coordinates to go from the north gate to the main gate (still random, not sorted)

Creating unsorted information files, which is used by create_map.c

On terminal, type the following:

./run.bat

gps.html

Will be created, open it with browser

Your homework – generate the sorted coordinates (fill out blank box)

1 2

```
#include "ADT_llist.h"

#define SORT 0 //sort
```

Define SORT macro (delete comment at 3rd line)

```
#else

    for(i = 0; i < D_SIZE; i++) {
        if(!add_node_at(list, list -> count, &path[i])) {
            printf("data insertion fatiled on list!\n");
        } else {
            printf("data insertion ok on list!\n");
        }
    }

1   sort_list(list, path);
```

2 Creating sorted information files
(Similar to left fraction of code)

```
#ifndef SORT
    for(i = 0; i < D_SIZE; i++) {
        fprintf(fnode, "%lf %lf\n", path[i].x,
    }
    for(i = 0; i < D_SIZE-1; i++) {
        fprintf(flink, "%lf %lf %lf %lf\n", pat
    }
#else
```

```
#endif

   return 0;
}

void sort_list(LLIST* list, void* data) {
    int i, j;
    void* stand;
    void* walk;
    void* tmp;

    POINT* path = (POINT*)data;

    for(i = 0; i < (list -> count)-1; i++) {
        for(j = i + 1; j < (list -> count); j++) {
```

Program code with your style!
This is just an example!

1 Tip: Sort using x coordinates of struct point.

Do not create another linked list!!!
(only use the list given by argument)

```
        }
    }
}
```


KNU

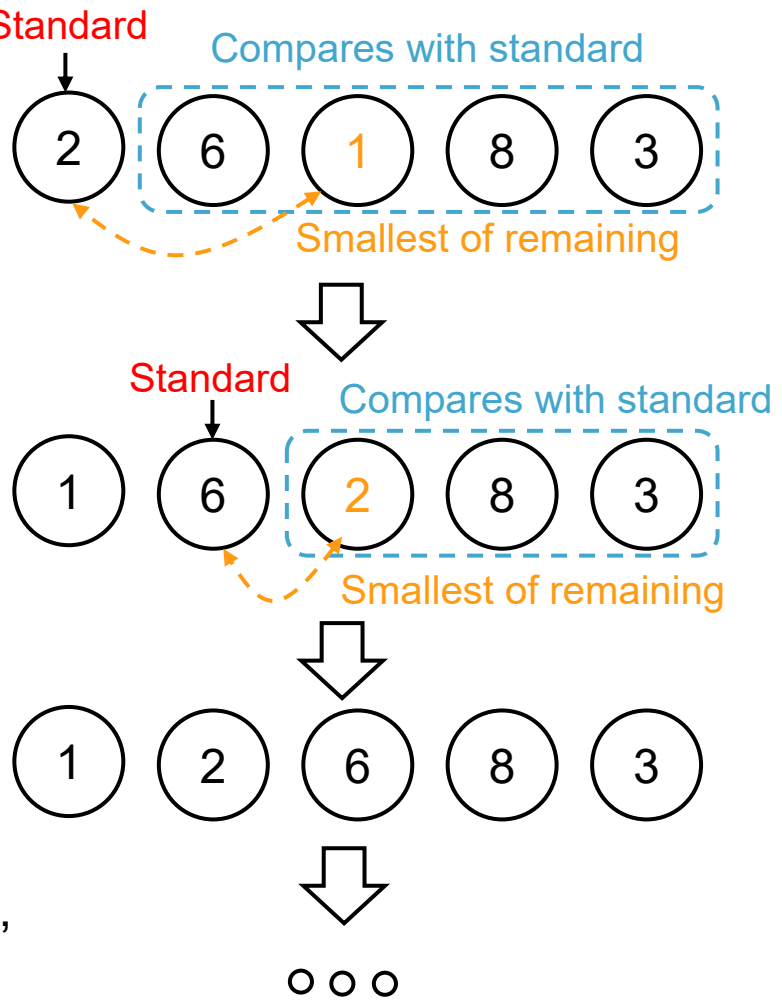
Hint for your homework

- Sort using selection sort concept in array

```c
#include <stdio.h>

int main() {
    int arr[5] = {2, 6, 1, 8, 3};
    int i;

    selection_sort(arr);

    for(i = 0; i < 5; i++) {
        printf("%d ", arr[i]);
    }
    printf("\n");
}

void selection_sort(int* arr) {
    int i, j, tmp;
    for(i = 0; i < 4; i++) {
        for(j = i+1; j < 5; j++) {
            if(arr[i] > arr[j]) {
                tmp = arr[i];
                arr[i] = arr[j];
                arr[j] = tmp;
            }
        }
    }
}
```

Result

```
moonhg@moonhg-VirtualBox:~$ ./sort
1 2 3 6 8
```



- It is helpful to draw a diagram of linked list.
- It is easy to use the add_node_at, del_node_at, get_data_at function.

Show sorted paths in google map(result)

Debugging (When you run gps.html, you get a blank screen)

```
1 <!DOCTYPE html>
2 <html>
3     <head>
4         <style type="text/css">
5             html, body {height: 100%; margin: 0; padding: 0; }
6             #map { height: 100%; }
7         </style>
8     </head>
```

check %

```
49          function initMap() {
50              var mylatlng = new google.maps.LatLng(35.887085, 128.609089);
51              var mapOptions = {
52                  zoom: 16,
53                  center: mylatlng
54              };
```

check

If you run it in Windows, you will get this error.

Submit (Due: 2017-10-26 , PM 10:00)

- Korean student needs to submit two files, into ABEEK website
  - (1) Source code:
    - Compress your homework folder, named hw2_[id].zip
      - For example, **hw2_20161235.zip**
  - (2) Report
    - In addition, **attach the report** (Microsoft word format) to explain your homework in terms of implementation.
- Foreign students have to mail me directly with these two files as attachment
  - boltanut@knu.ac.kr

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Cloud-Connected IoT System Platform Lab.
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To be continued …