

Structure with Pointer and Memory Allocation

Yung-Hsiang Lu

person.h

```
Person - NetBeans IDE 6.7.1
File Edit View Navigate Source Refactor Run Debug Profile Team Tools Window Help
person.h x person.c x main.c x
/*
 * File: person.h
 * Author: yunglu
 */
#ifndef _PERSON_H
#define _PERSON_H
typedef struct
{
    char * name;
    int age;
} Person;
Person Person_construct(int a, char * n);
void Person_destruct(Person p);
int Person_getAge(Person p);
char * Person_getName(Person p);
void Person_print(Person p);
#endif /* _PERSON_H */
22 | 1 | INS
```

**Use C++ terminology
“attribute”, “object”,
“constructor” and “destructor”**

person.c

```
Person - NetBeans IDE 6.7.1
File Edit View Navigate Source Refactor Run Debug Profile Team Tools Window Help
person.h x person.c x main.c x
#include "person.h"
#include <stdio.h>
#include <string.h>

Person Person_construct(int a, char * n) {
    Person p;
    p.age = a;
    p.name = malloc(strlen(n) + 1); ← allocate memory
    strcpy(p.name, n);
    return p;
}

void Person_destruct(Person p) {
    free(p.name); ← release memory
}

int Person_getAge(Person p) {
    return p.age;
}

char * Person_getName(Person p) {
    return p.name;
}

void Person_print(Person p) {
    printf("name: %s, age: %d\n", p.name, p.age);
}
27 | 2 | INS
```

main.c

```
Person - NetBeans IDE 6.7.1
File Edit View Navigate Source Refactor Run Debug Profile Team Tools Window Help
person.h x person.c x main.c x
/*
 * File: main.c
 * Author: yunglu
 *
 * Created on October 1, 2009, 10:16 PM
 */
#include <stdio.h>
#include <stdlib.h>
#include "person.h"
/*
 *
 */
int main(int argc, char** argv)
{
    Person p1 = Person_construct(21, "Amy Johnson");
    Person_print(p1);
    Person p2 = Person_construct(20,
        "A Name that is very long and need more space");
    Person_print(p2);
    printf("p1's age is %d\n", Person_getAge(p1));
    printf("p2's name is %s\n", Person_getName(p2));
    Person_destruct(p1);
    Person_destruct(p2);
    return (EXIT_SUCCESS);
}
```

call destructors to release memory otherwise, memory leak

27 | 1 | INS

Makefile

tab, not
space

```
Terminal
File Edit View Terminal Help

[Ubuntu Linux ] more Makefile

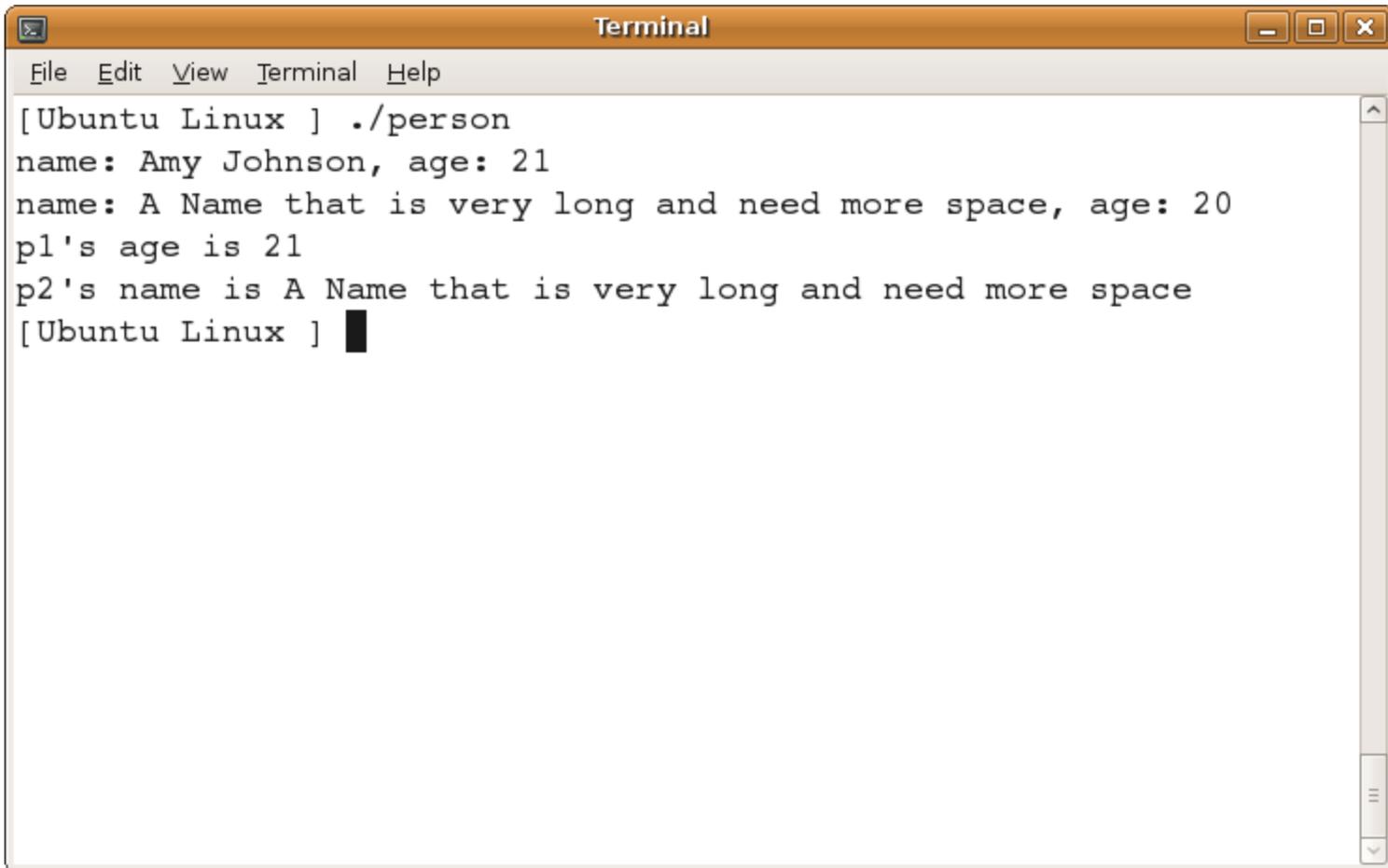
# Makefile
person: person.h person.c main.c
    gcc -g -Wall -c person.c
    gcc -g -Wall -c main.c
    gcc -g -Wall person.o main.o -o person

clean:
    rm -f *.o person

[Ubuntu Linux ] make
gcc -g -Wall -c person.c
gcc -g -Wall -c main.c
gcc -g -Wall person.o main.o -o person
[Ubuntu Linux ]
```

type make instead of
many gcc commands

Output

A terminal window titled "Terminal" with a menu bar containing "File", "Edit", "View", "Terminal", and "Help". The terminal content shows the execution of a program in the current directory. The output consists of five lines: the first line is the prompt "[Ubuntu Linux]" followed by the command "./person"; the second line is "name: Amy Johnson, age: 21"; the third line is "name: A Name that is very long and need more space, age: 20"; the fourth line is "p1's age is 21"; and the fifth line is "p2's name is A Name that is very long and need more space". The prompt "[Ubuntu Linux]" is followed by a black cursor block.

```
[Ubuntu Linux ] ./person
name: Amy Johnson, age: 21
name: A Name that is very long and need more space, age: 20
p1's age is 21
p2's name is A Name that is very long and need more space
[Ubuntu Linux ] █
```