电子科技大学

计算机专业类课程

实验报告

课程名称：计算机操作系统

学　　院：计算机科学与工程学院

专　　业：计算机科学与技术

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实验三

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一、 实验项目名称： 页式存储逻辑地址到物理地址映射

∗ 条件：64位地址空间

∗ 输入：

∗ 页记录大小（如 4Byte）

∗ 页大小（如 4KB）

∗ 逻辑地址（十六进制）

∗ 输出：物理地址（物理块号，块内偏移）

二、实验原理：

```
//
//  main.cpp
//  lab 3
//


#include<iostream>
#include<map>
#include<math.h>
#include<string>

using namespace std;

#define SIZE_ADDRESS 64
```

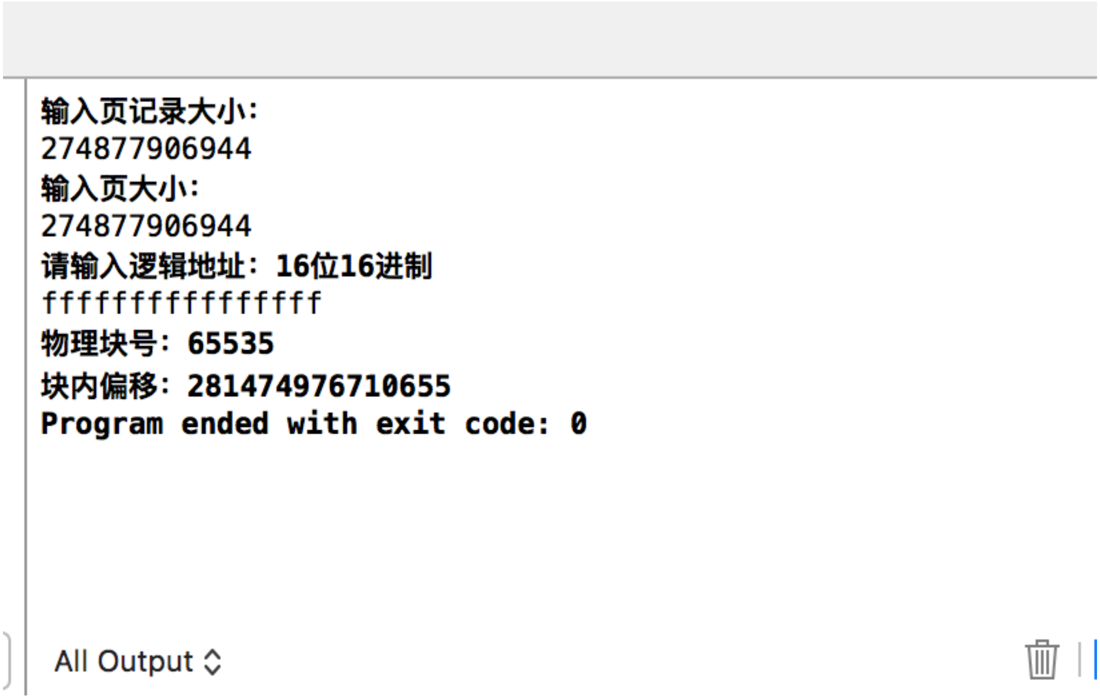
```
struct Page{
    long long int num;
    map<long long int, Page> data;
};

Page PAGE;

int ADDRESS = 0;

Page Init_page(int level_page, const long long int
num_item_level,
               const int num_bit_last,const long long int num)
{
    Page page;
    page.num = num;

    if (level_page == 0)
    {
        long long int num_item_last;
        num_item_last = pow(2, num_bit_last);
        for (int i = 0; i < num_item_last; i++)
        {
            Page p;
            p.num = ADDRESS;
            page.data[i] = p;
            ADDRESS++;
        }
    }
    else if (level_page>0)
    {
        level_page--;
        for (int i = 0; i < num_item_level; i++)
        {
            Page p;
            p = Init_page(level_page, num_item_level,
num_bit_last,i);
            page.data[i] = p;
        }
    }
    return page;
}



void Run(const int size_address,const long long int
size_page_item,
         const long long int size_page,unsigned const long
long int logic_address)
{
    int level_page = 0;
    int num_bit_offset = 0;
    int num_bit_all_num_page;
    int num_bit_level;
    long long int num_item_level;
    int num_bit_last;

    num_bit_offset = log10(size_page)/log10(2);
    num_bit_all_num_page = size_address - num_bit_offset;


    num_item_level = size_page / size_page_item;
    num_bit_level = log10(num_item_level) / log10(2);
    level_page = num_bit_all_num_page / num_bit_level;
    num_bit_last = num_bit_all_num_page%num_bit_level;


    PAGE = Init_page(level_page, num_item_level,
num_bit_last,0);

    long long int offset = logic_address % size_page;
    long long int num_block;
    long long int num_all_page = logic_address / size_page;
    long long int last_address = num_all_page;
    long long int now_address[100];

    for (int i = 0; i < level_page; i++)
    {
        now_address[i] = last_address / pow(2,
num_bit_all_num_page - (num_bit_level*(i+1)));
        last_address = last_address % (int)pow(2,
num_bit_all_num_page - (num_bit_level*(i + 1)));
    }
    Page *page = &PAGE;
    for (int i = 0; i < level_page; i++)
    {
        page = &page->data[now_address[i]];
    }
    num_block = page->data[last_address].num;
    cout << "物理块号：" << num_block << endl << "块内偏移：" <<
offset << endl;

}

unsigned long long int _16_10(char num16[])
{
    unsigned long long int num10 = 0;
    float i = 0;
    for (int j = SIZE_ADDRESS/4-1; j>=0;j--)
    {
        if (num16[j] <= '9'&&num16[j] >= '0')
            num16[j] = num16[j] - 48;
        else if (num16[j] <= 'F'&&num16[j] >= 'A')
            num16[j] = num16[j] - 55;
        else if (num16[j] <= 'f'&&num16[j] >= 'a')
            num16[j] = num16[j] - 87;
    }
    for (int j = SIZE_ADDRESS / 4 - 1; j >= 0; j--)
    {
        long long int pow_16_i;
        pow_16_i = pow(16, i);
        num10 = num10 + (long long int)num16[j] * pow_16_i;
        i++;
    }
    return num10;
}

int main()
{
    long long int size_page_item;
    long long int size_page;
    char logic_address16[SIZE_ADDRESS/4+1];
    unsigned long long int logic_address10;
    cout << "输入页记录大小：" << endl;
    cin >> size_page_item;
    cout << "输入页大小：" << endl;
    cin >> size_page;
    cout << "请输入逻辑地址："<<SIZE_ADDRESS/4<<"位16进制" <<
endl;
    cin >> logic_address16;
    size_page = size_page * 1024;
    logic_address10 = _16_10(logic_address16);
    Run(SIZE_ADDRESS, size_page_item, size_page,logic_ad-
dress10);

}
```

七、实验器材（设备、元器件）：

PC Xcode

八、实验步骤及数据结果分析：

输入页记录大小 页大小 逻辑地址后：



```
输入页记录大小:
274877906944
输入页大小:
274877906944
请输入逻辑地址: 16位16进制
ffffffffffffffff
物理块号: 65535
块内偏移: 281474976710655
Program ended with exit code: 0
```

报告评分：

指导教师签字：