时钟与闹钟

实验报告

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1. cmd下的伪图形界面实现一个时钟及闹钟工具

1.1.操作方法及要求

【基本作业要求:】

1、能以指针式和数字式两种形式显示一个时钟，两种显示方式间可以使用快捷键进行切换

2、当前的年月日，要以某种方式显示出来

3、时钟的时间取系统时间，如果通过 Windows 控制面板/任务栏调整当前系统时间，则时钟的显示时间要同步变化

4、支持定义闹钟，闹钟要允许多个，闹铃方式也可以多种（每日/每工作日/单次/倒计时等，其中工作日简单计算星期即可，不必考虑节假日调班情况）,到达闹钟设置的时间点后，要能够播放音乐

（cmd 下播放音频的方法自行查找资料）

5、闹钟的定义要能够关闭程序并再次启动后仍生效，配置文件的格式自行定义

【加分作业要求:】

1、支持多时区闹钟（例：同时显示北京/巴黎），加 1 分

2、其他你认为可以完成的，和时钟/闹钟有关的功能，可以加入，酌情给予加分（也可以完前向老师描述大致的实现效果，询问大致的加分值）

3、程序整体完成后，除完成基本要求能得到相应的基本分数外，还会根据整体完成情况（包括代码质量、显示效果、人机交互的友好程度等）给予最高 3 分的加分（本加分项为主观分数无统一要求及标准）

装 订 线

2. 整体设计思路

先打印指针式表盘,在打印数字式表盘,最后打印闹钟选择.

主要分三个功能,指针式表盘相对制作难度最大,需要先打印出圆形表盘,由于打印的一个字符串的高度和宽度不等,所以需要将宽度乘以一个系数使之看起来更加美观,之后打印指针,为了使指针更加明显需要将指针宽度扩大,这就变得比较复杂了.打印指针即先用三角函数确定其直线的方程,因为不能始终按照x或y增加进行取点(这样会使指针逼近竖直或水平时几乎显示不出),所以要判断其横纵性并将其直线方程向左右或上下进行平移来增加指针宽度,同时也可以改变其颜色.为了让秒针或分针从59到60时不至于让分针或时针突变,让分钟数与小时数取精确值.打印国际时钟就只需要在表盘旁边加一个加或减几小时的时钟即可.

数字式表盘和闹钟的打印主要都是进行字符的led显示,而闹钟要构造出24 60 60的满额,如超则循环,具体实现已在程序中得到体现.

3. 主要功能的实现

打印指针式时钟,数字式时钟,闹钟并实现闹钟的输出.

4. 调试过程碰到的问题

碰到的问题主要有下:

1. 冲突数据的处理
2. Led的打印

5. 心得体会

从这次作业我得到的主要教训有下:

1. 写之前多考虑一些之后的可能情况

在写后几个图形界面函数时很明显的遇到了很多次的问题就是之前在写这个函数时只想到了实现眼下的功能所需要的参数进行传入,后续功能或者完善程序时发现还需要别的参数,于是又要修改,这些函数很多还是中间函数,修改传参就要从前面一个一个函数依次修改,浪费了一些时间.

2. 多加注释 多使用宏定义和常变量

加注释的作用很明显:让阅读的人更容易看懂,包括自己之后debug时也会变得容易.

为了达到这个目的,定义函数名参数名也应该避免使用fun,a,b,c这样的名字,在一个大程序中这样的参数多了会让阅读变得非常困难.使用宏定义常变量的目的,一是为了让阅读变得方便,一个OK,ERROR肯定要比1,0看起来更加易懂,-1,-2等特殊返回值也变得更直观.二是为了让修改方便,一个使用很多次的常量如果要修改只需要在.h里面修改一次即可实现,使用宏定义常变量也可以让计算式变得易写易懂不易出错.因为这方面的练习较少,我在这次作业中的使用还很不好,图形界面的计算还是在用常数实现,以后需要多加注意.

3. 修改时瞻前顾后

修改时看看函数的前后是否有需要牵连修改的地方,而不是只有编译报错才会注意到去修改.

4. 提高debug效率

Bug的出现是难免的,但是如何快速的找出bug并改正算是比写代码还要更高难度的技能.积累错误修改经验,巧妙设置断点和通过弹窗报错行按需增加数组的输出或者对可能出错的数组越界问题进行检查都是将来debug过程中需要注意的.

这次的大作业的完成,我用了两天时间,但是纯写代码还是只用了不到一天时间,剩下的时间几乎都是在debug,说明我的代码在完成的过程中没有考虑到可能出现的bug,和如果出现bug的处理方法,毕竟bug几乎是难以避免的,但是如何减少bug,有意把可能出现bug的地方暴露出来和在出现了bug后将debug时间减少到最短 比写代码还要重要.这是以后要注意的,并不是写代码写得快一些就可以完事.

6. 附件：源程序

```
/*1551265 计1 张伯阳*/
/* 1551265  计1  张伯阳 */
#include "90-b3.h"
#include "cmd_console_tools.h"
void clockWorkDay(int clk_num, int pattern[], int clk_work[])
{
	char tmp[10];
	time_t t = time(0);
	strftime(tmp, sizeof(tmp), "%w", localtime(&t));
	if (tmp[0] == '0' || tmp[0] == '6')
		for (int i = 1; i <= clk_num; i++)
			if (pattern[i] == 2)
				clk_work[i] = 0;//工作日闹钟是否工作判断
}


void printYTD()
{
	char tmp[30];
	time_t t = time(0);
	strftime(tmp, sizeof(tmp), "%Y  %B  %A", localtime(&t));
	ToFull(4 * R, 1, tmp, 15);
}

void ToFull(int x, int y, char str[], int color, bool large)
{
	char result[100] = "";
	unsigned char tmp; unsigned char tmp1;
	for (unsigned int i = 0; i < strlen(str); i++)
	{
		tmp = str[i];
		tmp1 = str[i + 1];
		if (tmp>32 && tmp<128)//半角字符
		{
			result[2 * i] += 163;//第一个字节设置为163
			result[2 * i + 1] += (unsigned char)str[i] + 128;//第二个字节+128;
		}
		else if (tmp == 32)//处理半角空格
			result[2 * i] += 161, result[2 * i + 1] += 161;
		else//全角字符
			i++;
	}
	hanzi16(x, y, result, color, large);
}

void hanzi16(int x, int y, char *s, int color, bool large)
{
	FILE *fp;
	char buffer[32];
	int i, j, k;
	unsigned char qh, wh;
	unsigned long location;
	if ((fp = fopen("hzk16", "rb")) == NULL)
	{
		printf("Cant open hzk16!");
		exit(0);
	}
	while (*s)
	{
		qh = *s - 0xa0;
```

```
            wh = *(s + 1) - 0xa0;
            location = (94 * (qh - 1) + (wh - 1)) * 32L;
            fseek(fp, location, SEEK_SET);
            fread(buffer, 32, 1, fp);
            for (i = 0; i < 16; i++)
                for (j = 0; j < 2; j++)
                    for (k = 0; k < 8; k++)
                        if (((buffer[i * 2 + j] >> (7 - k)) & 0x1) != NULL)
                            if (!large)
                                showch(hout, x+ 8 * j + k, int(y + i*0.6), '*', 0, color);
                            else
                                showch(hout, x+ 2 * (8 * j + k), int(y + 2 * i*0.60), '*', 0, color);
            s += 2;
            x += 16;
        }
        fclose(fp);
}

/* 1551265 计1 张伯阳 */
#include "90-b3.h"
#include "cmd_console_tools.h"
int main()
{
        cout << "快捷键提示:\n1.回车键进行指针式和数字式时钟切换\n2.空格键进入/保存退出闹钟设置\n3.q键停止当前闹钟\n4.在时钟模式下按Esc键可退出\n\n回车键继续" << endl;
        while (!(_getch() == '\r'));
        system("cls");
        setconsoleborder(hout, 1000, 500, 500);
        setfontsize(hout, L"点阵字体", 4);
        fstream clock;
        clock.open("clock.txt", ios::in);
        int clk_num = 0, pattern[100] = { 0 }, clk_h[100] = { 0 }, clk_m[100] = { 0 }, clk_work[100] = { 0 };
        if (!clock.is_open())
        {
                clock.open("clock.txt", ios::out);
                clock.close();
        }
        else
        {
                clock >> clk_num;
                for (int i = 1; i <= clk_num; i++)
                        clock >> pattern[i] >> clk_h[i] >> clk_m[i], clk_work[i] = 1;
                clock.close();
        }
        clockWorkDay(clk_num, pattern, clk_work);
        int choice = 1;
        while (choice)
        {
                if (choice == 1)
                        choice = printRoundClock(clk_num, pattern, clk_h, clk_m, clk_work);
                if (choice == 2)
                        choice = printNumClock(clk_num, pattern, clk_h, clk_m, clk_work);
                if (choice == 3)
                        choice = alarm(&clk_num, pattern, clk_h, clk_m, clk_work);
        }
}

/* 1551265 计1 张伯阳 */
#include "90-b3.h"
#include "cmd_console_tools.h"

void extend()
{
```

```
    hanzi16(ox + deviation - 16 * 2, oy + int(R*proportion), "伦敦时间", 15);
}

/* 1551265 计1 张伯阳 */
#include "90-b3.h"
#include "cmd_console_tools.h"

int printRoundClock(int clk_num, int pattern[], int clk_h[], int clk_m[], int clk_work[])
{
    system("cls");
    char tmp[10];
    double dir[12][2];
    for (int i = 0; i < 12; i++)//打印刻度
        dir[i][0] = cos(PI*i / 6), dir[i][1] = sin(PI*i / 6);
    for (int x = ox - R - 1; x <= ox + R + 1; x++)//打印表盘
        for (int y = oy - R - 1; y <= oy + R + 1; y++)
            if (pow((x - ox), 2) + pow((y - oy), 2) >= pow(R - 1, 2) && pow((x - ox), 2) + pow((y - oy), 2) <=
pow(R + 1, 2))
            {
                showch(hout, x, int(y*proportion), '', 15, 15);
                showch(hout, x + deviation, int(y*proportion), '', 15, 15);
            }
    hanzi16(ox - 16 * 2, oy + int(R*proportion), "北京时间", 15);
    extend();
    printYTD();//打印年月日
    for (int i = 0; i < 12; i++)
    {
        printPoint(int(ox + dir[i][0] * R), int(oy + dir[i][1] * R));
        printPoint(int(ox + deviation + dir[i][0] * R), int(oy + dir[i][1] * R));
    }
    while (1)
    {
        time_t t = time(0);
        strftime(tmp, sizeof(tmp), "%X", localtime(&t));
        int h = tmp[0] * 10 + tmp[1] - 11 * '0', m = tmp[3] * 10 + tmp[4] - 11 * '0', s = tmp[6] * 10 + tmp[7] - 11 * '0',
flagRing = 0;
        for (int i = 1; i <= clk_num; i++)
            if (h == clk_h[i] && m == clk_m[i] && clk_work[i])
            {
                PlaySound(TEXT("music.wav"), NULL, SND_FILENAME);
                flagRing = i;
                break;
            }
        double h_exact = h % 12 + m*1.0 / 60, m_exact = m + s*1.0 / 60;
        double h_London = (h + 12 - 7) % 12 + m*1.0 / 60;
        printHand_BJLD(h_exact, h_London, m_exact, s);
        if (_kbhit())
        {
            char ch = _getch();
            if (ch == '\r')
                return 2;
            else if (ch == ' ')
                return 3;
            else if (ch == 27)
                return 0;
            else if (flagRing&&ch == 'q')
                clk_work[flagRing] = 0;//到alarm函数再改文件
        }
    }
}

void printHand_BJLD(double h_exact, double h_London, double m_exact, double s)
{
```

```
	bool flag_h = (h_exact >= 10.5&&h_exact <= 12) || (h_exact >= 0 && h_exact <= 1.5) || (h_exact >= 4.5&&h_exact <= 7.5);//计算偏XY  偏X:0  偏y:1
	bool flag_hLD = (h_London >= 10.5&&h_London <= 12) || (h_London >= 0 && h_London <= 1.5) || (h_London >= 4.5&&h_London <= 7.5);
	bool flag_m = (m_exact >= 52.5&& m_exact <= 60) || (m_exact >= 0 && m_exact <= 7.5) || (m_exact >= 22.5&&m_exact <= 37.5);
	bool flag_s = (s >= 52.5&&s <= 60) || (s >= 0 && s <= 7.5) || (s >= 22.5&&s <= 37.5);
	for (int i = 0; i <= 1; i++)
	{
		printHand(!i*h_exact + i*h_London, !i*flag_h + i*flag_hLD, 1, i);//打印
		printHand(m_exact, flag_m, 2, i);
		printHand(double(s), flag_s, 3, i);
	}
	Sleep(pertime);
	for (int i = 0; i <= 1; i++)
	{
		printHand(!i*h_exact + i*h_London, !i*flag_h + i*flag_hLD, 4, i);//消除
		printHand(m_exact, flag_m, 5, i);
		printHand(double(s), flag_s, 6, i);
	}
}

void printHand(double t, bool flag, int i, int timeZone)//打印指针 i为选项 1为时针 2为分针 3为秒针 4为消时针 5为消分针 6为消秒针
{
	int oxx = ox;
	if (timeZone)
		oxx += deviation;
	double r, angle = i == 1 ? 30 * t : 6 * t;//角度
	angle = angle / 180 * PI;//转换成弧度
	if (i == 1)
		r = h_len;
	else if (i == 2)
		r = m_len;
	else
		r = s_len;
	double xx = r*sin(angle), yy = r*cos(angle);
	if (flag && (t >= 4.5&&t <= 7.5 && (i == 1 || i == 4) || t >= 22.5&&t <= 37.5&&i != 1 && i != 4))//向下
		for (int y = oy; y <= oy - yy; y++)
		{
			double x = -xx / yy*(y - oy) + oxx;
			printHandShow(int(x), int(y), i, 1);
		}
	else if (flag)//向上
		for (int y = oy; y >= oy - yy; y--)
		{
			double x = -xx / yy*(y - oy) + oxx;
			printHandShow(int(x), int(y), i, 1);
		}
	else if (!flag && (t > 4.5&&i == 1 || t > 22.5&&i != 1))//向左
		for (int x = oxx; x >= oxx + xx; x--)
		{
			double y = -yy / xx*(x - oxx) + oy;
			printHandShow(int(x), int(y), i, 0);
		}
	else//向右
		for (int x = oxx; x <= oxx + xx; x++)
		{
			double y = -yy / xx*(x - oxx) + oy;
			printHandShow(int(x), int(y), i, 0);
		}
}
```

```
void printHandShow(double x, double y, int i, bool flag)
{
	if (i <= 3)
	{
		showch(hout, int(x - flag), int(y*proportion - !flag), ' ', 15, 15);
		showch(hout, int(x), int(y*proportion), ' ', i + i / 3, i + i / 3);
		showch(hout, int(x + flag), int(y*proportion + !flag), ' ', 15, 15);
	}
	else
	{
		showch(hout, int(x - flag), int(y*proportion), ' ', 0, 0);
		showch(hout, int(x - flag), int(y*proportion - !flag), ' ', 0, 0);
		showch(hout, int(x), int(y*proportion), ' ', 0, 0);
		showch(hout, int(x + flag), int(y*proportion), ' ', 0, 0);
		showch(hout, int(x + flag), int(y*proportion + !flag), ' ', 0, 0);
	}
}

void printPoint(int x, int y)
{
	for (int i = x - 1; i <= x + 1; i++)
		for (int j = y - 1; j <= y + 1; j++)
			if (fabs(x - ox) < 3 || !(y - oy) || fabs(x - ox - deviation) < 3)
				showch(hout, i, int(j*proportion), ' ', 12, 12);
			else
				showch(hout, i, int(j*proportion), ' ', 9, 9);
}
int printNumClock(int clk_num, int pattern[], int clk_h[], int clk_m[], int clk_work[])
{
	system("cls");
	printYTD();
	char tmpH[10] = "", tmpM[10] = "", tmpS[10] = "";
	while (1)
	{
		char H[10], M[10], S[10];
		time_t t = time(0);
		strftime(H, sizeof(H), "%H:", localtime(&t));
		strftime(M, sizeof(M), "%M:", localtime(&t));
		strftime(S, sizeof(S), "%S", localtime(&t));
		if (strcmp(tmpH, H))
			for (int x = 0; x <= 180; x++)
				for (int y = 0; y <= 15; y++)
					showch(hout, R + x, R + y, ' ', 0, 0);
		else if (strcmp(tmpM, M))
			for (int x = 0; x <= 120; x++)
				for (int y = 0; y <= 15; y++)
					showch(hout, R + 60 + x, R + y, ' ', 0, 0);
		else
			for (int x = 0; x <= 60; x++)
				for (int y = 0; y <= 15; y++)
					showch(hout, R + 120 + x, R + y, ' ', 0, 0);
		int h = H[0] * 10 + H[1] - 11 * '0', m = M[3] * 10 + M[4] - 11 * '0', flagRing = 0;
		for (int i = 1; i <= clk_num; i++)
			if (h == clk_h[i] && m == clk_m[i] && clk_work[i])
			{
				PlaySound(TEXT("music.wav"), NULL, SND_FILENAME);
				flagRing = i;
				break;
			}

		if (_kbhit())
		{
			char ch = _getch();
```

```
                if (ch == '\r')
                        return 1;
                else if (ch == ' ')
                        return 3;
                else if (ch == 27)
                        return 0;
                else if (flagRing&&ch == 'q')
                        clk_work[flagRing] = 0;//到alarm函数再改文件
        }
        if (strcmp(tmpH, H))
        {
                ToFull(R, R, H, 15, 1);
                strcpy(tmpH, H);
        }
        if (strcmp(tmpM, M))
        {
                ToFull(R + 60, R, M, 15, 1);
                strcpy(tmpM, M);
        }
        ToFull(R + 120, R, S, 15, 1);
        strcpy(tmpS, S);
        Sleep(pertime / 2);
    }
}


/* 1551265 计1 张伯阳 */
#include "90-b3.h"
#include "cmd_console_tools.h"
int alarm(int *clk_num, int pattern[], int clk_h[], int clk_m[], int clk_work[])
{
    system("cls");
    for (int i = 1; i <= *clk_num; i++)
        if (!clk_work[i] && pattern[i]>2)
        {
            for (int j = i; j < *clk_num; j++)
            {
                clk_h[j] = clk_h[j + 1];
                clk_m[j] = clk_m[j + 1];
                pattern[j] = pattern[j + 1];
                clk_work[j] = 1;
            }
            *clk_num--;
            if (!clk_work[i] && pattern[i] <= 2)
                clk_work[i] = 1;
        }//将进行过的闹钟清除
    while (1)
    {
        int cho_num = alarmChoice(*clk_num);
        if (!cho_num)
            break;
        int cho_pattern = patternChoice(pattern[cho_num]);
        int time[5] = { 0 };//储存时间
        time[1] = clk_h[cho_num] / 10, time[2] = clk_h[cho_num] % 10, time[3] = clk_m[cho_num] / 10, time[4] =
clk_m[cho_num] % 10;
        timeChoice(time, cho_num);
        *clk_num += (cho_num > *clk_num);
        pattern[cho_num] = cho_pattern;
        clk_h[cho_num] = time[1] * 10 + time[2];
        clk_m[cho_num] = time[3] * 10 + time[4];
        clk_work[cho_num] = 1;
        clockWorkDay(*clk_num, pattern, clk_work);
        system("cls");
```

```
    }
    ofstream clock("clock.txt");
    clock << *clk_num << " ";
    for (int i = 1; i <= *clk_num; i++)
        clock << pattern[i] << " " << clk_h[i] << " " << clk_m[i] << " ";
    clock.close();
    return 1;
}

void stopWatch(int tm[])//倒计时闹钟的翻译
{
    char H[10], M[10];
    int  h, m;
    time_t t = time(0);
    strftime(H, sizeof(H), "%H:", localtime(&t));
    strftime(M, sizeof(M), "%M:", localtime(&t));
    h = H[0] * 10 + H[1] - 11 * '0', m = M[0] * 10 + M[1] - 11 * '0';
    m += (tm[3] * 10 + tm[4]);
    h += (tm[1] * 10 + tm[2] + m / 60);
    m %= 60, h %= 24;
    tm[1] = h / 10, tm[2] = h % 10, tm[3] = m / 10, tm[4] = m % 10;
}

int alarmChoice(int num)
{
    int cho_num = 1;
    char str_num[10] = "";
    while (1)
    {
        int hit;
        for (int i = 1; i <= num; i++)
        {
            if (i / 10)
                str_num[0] = i / 10 + '0', str_num[1] = i % 10 + '0';
            else
                str_num[0] = i % 10 + '0';
            hanzi16(20, 20 + 20 * i, "闹钟", -3 * (i == cho_num) + 15);
            ToFull(50, 20 + 20 * i, str_num, -3 * (i == cho_num) + 15);
        }
        hanzi16(20, 20 + 20 * (num + 1), "新建闹钟", -3 * (num + 1 == cho_num) + 15);
        if ((hit = _getch()) < 127)
            if (hit == 80 && cho_num <= num)
                cho_num++;
            else if (hit == 72 && cho_num > 1)
                cho_num--;
            else if (hit == '\r' || hit == 77)
                return cho_num;
            else if (hit == ' ')
                return 0;
    }
}

int patternChoice(int cho_num)
{
    if (!cho_num)
        cho_num++;
    while (1)
    {
        int hit;
        hanzi16(100, 20 + 20 * 1, "每日", -3 * (1 == cho_num) + 15);
        hanzi16(100, 20 + 20 * 2, "每工作日", -3 * (2 == cho_num) + 15);
        hanzi16(100, 20 + 20 * 3, "单次", -3 * (3 == cho_num) + 15);
        hanzi16(100, 20 + 20 * 4, "倒计时", -3 * (4 == cho_num) + 15);
```

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```
            if ((hit = _getch()) < 127)
                if (hit == 80 && cho_num < 4)
                    cho_num++;
                else if (hit == 72 && cho_num > 1)
                    cho_num--;
                else if (hit == '\r' || hit == 77)
                    return cho_num;
        }
    }

    void timeChoice(int time[], int cho_y)
    {
        int cho_num = 1;
        char strTime_1[5], strTime_2[5] = "", strTime_3[5] = "", strTime_4[5] = "";
        strTime_1[0] = time[1] + '0', strTime_2[0] = time[2] + '0', strTime_3[0] = time[3] + '0', strTime_4[0] = time[4] + '0';
        while (1)
        {
            int hit;
            strTime_1[0] = time[1] + '0', strTime_2[0] = time[2] + '0', strTime_3[0] = time[3] + '0', strTime_4[0] =
    time[4] + '0';
            for (int i = 0; i < 30; i++)
                for (int j = 0; j < 20; j++)
                    showch(hout, 200 + ((cho_num - 1) + cho_num / 3) * 30 + i, 20 + 20 * cho_y + j, ' ', 0, 0);
            ToFull(200, 20 + 20 * cho_y, strTime_1, -3 * (1 == cho_num) + 15);
            ToFull(200 + 30 * 1, 20 + 20 * cho_y, strTime_2, -3 * (2 == cho_num) + 15);
            ToFull(200 + 30 * 2, 20 + 20 * cho_y, " :", 15);
            ToFull(200 + 30 * 3, 20 + 20 * cho_y, strTime_3, -3 * (3 == cho_num) + 15);
            ToFull(200 + 30 * 4, 20 + 20 * cho_y, strTime_4, -3 * (4 == cho_num) + 15);
            if ((hit = _getch()) < 127)
                if (hit == 77 && cho_num < 4)
                    cho_num++;
                else if (hit == 75 && cho_num > 1)
                    cho_num--;
                else if (hit == '\r')
                    break;
                else if (hit == 72)
                {
                    if (cho_num == 1 && (time[2] < 4 && time[cho_num] < 2 || !time[cho_num]))
                        time[cho_num]++;
                    else if (cho_num == 1)
                        time[cho_num] = 0;
                    else if (cho_num == 2 && (time[1] < 2 || time[cho_num] < 3))
                    {
                        time[cho_num]++;
                        time[cho_num] %= 10;
                    }
                    else if (cho_num == 2)
                        time[cho_num] = 0;
                    else if (cho_num == 3)
                    {
                        time[cho_num]++;
                        time[cho_num] %= 6;
                    }
                    else if (cho_num == 4)
                    {
                        time[cho_num]++;
                        time[cho_num] %= 10;
                    }
                }
                else if (hit == 80)
                {
                    if (cho_num == 1 && time[2] < 4 && !time[cho_num])
                        time[cho_num] = 2;
                    else if (cho_num == 1 && time[cho_num])
```

```
                time[cho_num]--;
            else if (cho_num==1)
                time[cho_num]=1;
            else if (cho_num==2 && (time[1] < 2 || time[cho_num]))
            {
                time[cho_num]--;
                time[cho_num]=(time[cho_num]+10) % 10;
            }
            else if (cho_num==2)
                time[cho_num]=3;
            else if (cho_num==3)
            {
                time[cho_num]--;
                time[cho_num]=(time[cho_num]+6) % 6;
            }
            else if (cho_num==4)
            {
                time[cho_num]--;
                time[cho_num]=(time[cho_num]+10) % 10;
            }
        }
        else if (hit >= '0'&&hit <= '9')
        {
            if (cho_num==1 && (time[2] < 4 && hit < '3' || hit < '2'))
                time[cho_num]=hit - '0';
            else if (cho_num==2 && (time[1] < 2 || hit < '4'))
                time[cho_num]=hit - '0';
            else if (cho_num==3 && hit<'6')
                time[cho_num]=hit - '0';
            else if (cho_num==4)
                time[cho_num]=hit - '0';
        }
    }
}
```

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