

객체지향설계 개인 텀프로젝트 보고서

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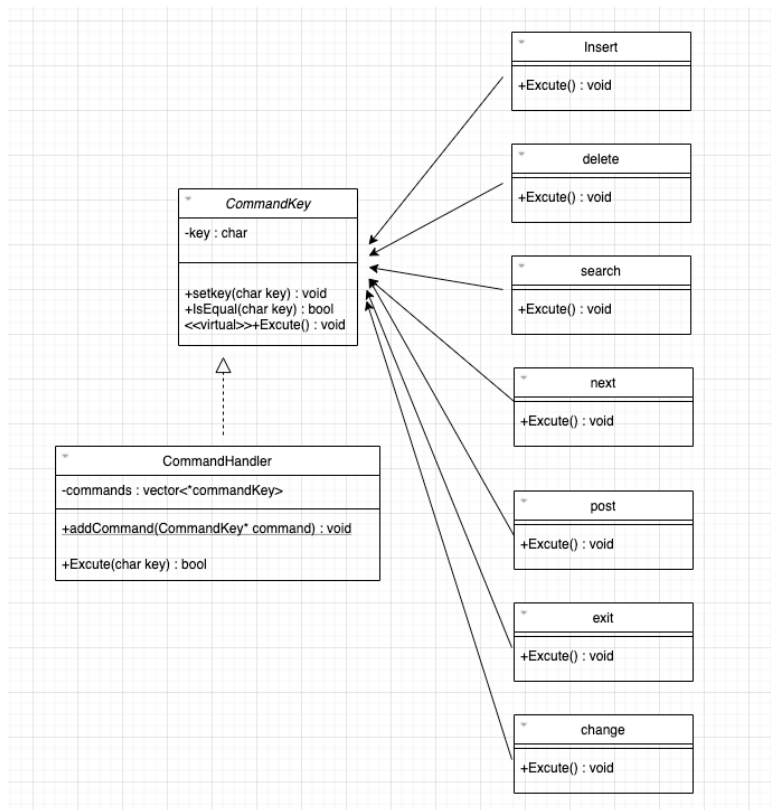
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GitHub 주소 : <https://github.com/HanCiHu/OOP>

1. 디자인 패턴

- 콘솔기반 텍스트 편집기를 구현하는 과정에서 여러가지 명령어에 따라 다른 기능을 구현해야 하는데 이때 코드의 디버깅과 코드 구조 파악이 쉬운 방식으로 구현하기 위해서는 명령패턴을 이용하는게 가장 적합하다고 생각해서 명령패턴을 이용하여 구현하였습니다.

2. 클래스 다이어그램



- 각각의 명령 클래스들은 `CommandKey` 클래스를 상속받았고 `CommandHandler` 클래스와 `CommandKey` 클래스는 상관관계입니다.

3. 주요 코드 설명

1) Main 함수

```
372 |     txt = getTxt();
373 |     make_pages();
374 |
375 |     do
376 |     {
377 |         printPage();
378 |         cout << "-----" << endl;
379 |         cout << "n:다음페이지, p:이전페이지, i:삽입, d:삭제, c:변경, s:찾기, t:저장후종료" << endl;
380 |         cout << "-----" << endl;
381 |         cout << "(콘솔 메세지) " << console_message << endl;
382 |         cout << "-----" << endl;
383 |         cout << "입력: "; cin >> command;
384 |         cout << "-----" << endl;
385 |
386 |         if (commands->Execute(command[0]) == false) console_message = "invalid command";
387 |
388 |     } while (command[0] != 't');
389 | }
```

- Main함수에서는 먼저 각각의 커맨드를 입력해주었고, 이후에는 먼저 getTxt함수로 전역변수 txt에 test.txt의 값을 받아줍니다.
- 이후 getTxt함수에서 받아온 txt값을 가지고 기본적인 words와 pages벡터의 값들을 초기화 해줍니다.
- 그 다음에는 do_while문을 돌면서 보여줘야하는 페이지를 출력하고 command 입력을 받는 과정을 반복해줍니다.

2) Make_pages 함수

```
313 | void make_pages()
314 | {
315 |     vector<string> lines;
316 |     istringstream ss(txt);
317 |     string word;
318 |     lines.clear();
319 |
320 |     while (getline(ss, word, ' ')){
321 |         words.push_back(word);
322 |     }
323 |
324 |     int len = 0 ;
325 |
326 |     for (int i = 0; i < words.size(); i++){
327 |         if (len + words[i].length() > 75){
328 |             pages.push_back(lines);
329 |             lines.clear();
330 |             lines.push_back(words[i]);
331 |             len = words[i].length();
332 |         }
333 |         else{
334 |             len += words[i].length();
335 |             lines.push_back(words[i]);
336 |         }
337 |     }
338 |     pages.push_back(lines);
339 | }
340 | }
```

- Make_pages 함수에서는 먼저 전역변수 words 벡터에 텍스트 안의 모든 단어를 넣어주기 위해 getline함수를 이용해서 공백을 기준으로 단어를 구분해서 words벡터에 값을 넣어주었습니다.
- 이후 words의 모든 단어를 라인을 기준으로 pages벡터에 넣어주는데 한 라인당 75바이트를 넘으면 안되므로 len변수를 이용해서 만약 len이 75가 넘으면 lines벡터 pages벡터에 넣어주고 len = 0, lines.clear()를 해주고 해당 단어를 다시 lines벡터에 넣어주는 방식으로 이를 구현하였습니다.

3) Insert : Execute 함수

```
class insert : public commandKey
{
public:
void Execute()
{
    regex re("i\\((\\d+),(\\d+),(\\w+)\\)");
    smatch match;
    if (regex_match(command, re)){
        regex_search(((const string)command).begin(),((const string)command).end(), match, re);

        int line = stringToInt(match[1]);
        int index = stringToInt(match[2]);

        if (line > 20 || line <= 0 || pages.size() - pages_index < line){
            console_message = "해당 line이 존재하지 않습니다.";
            return ;
        }
        if (index > pages[line - 1].size() || index < 0){
            console_message = "유효한 index를 입력해주세요.";
            return ;
        }
        if (match[3].length() > 75){
            console_message = "최대 75바이트 까지만 입력할수 있습니다.";
            return ;
        }
        pages[pages_index + line - 1].insert(pages[pages_index + line - 1].begin() + index, 1, match[3]);
        set_pages();
        console_message = command;
        return;
    }
    console_message = "i(line(int), index(int), word(string))형으로 입력해주세요.";
    return ;
}
};
```

- Insert명령에서 가장먼저 해야할것은 명령을 파싱하는 부분인데, 이것은 정규표현식을 이용하여 구현하였습니다.
- 정규표현식을 이용하여 command가 i(int,int,word)인지를 먼저 확인하고 아니라면 console_message에 형식에 맞지않다고 알려줍니다.
- 만약 정규표현식이 맞다면 line이 20이 넘는지, line이 음수인지, 그리고 마지막으로 search명령으로 라인이 20개 미만으로 콘솔창에 보이는 경우 보이는 라인보다 큰 숫자를 넣었는지를 확인하는 예외를 처리하게 코드를 구현하였습니다.
- 그 다음으로는 두번째 인자로 오는 index가 해당 라인의 단어의 개수보다 큰지 확인하는 예외를 처리하게 코드를 구현하였습니다.
- 이후에는 word의 바이트가 75가 넘는지 확인해주는 예외를 처리하게 구현하였습니다.
- 위 3가지의 예외를 모두 통과하면 수행가능한 명령 케이스라는 의미 이므로 벡터 라이브러리에 구현되어있는 insert함수를 이용해서 해당 부분에 word를 넣어주었습니다.
- 새로운 단어를 넣어줌으로 인해 콘솔화면이 다르게 표시가 되어야 할수도 있으므로 set_page 함수를 이용해 word와 pages 벡터를 업데이트 해주었습니다.

4) Delete : Execute 함수

```
class del : public commandKey
{
public:
void Execute()
{
    regex re("d\\((\\d+),(\\d+)\\)");
    smatch match;

    if (regex_match(command, re)){
        regex_search(((const string)command).begin(),((const string)command).end(), match, re);

        int line = stringToInt(match[1]);
        int index = stringToInt(match[2]) - 1;
        if (line > 20 || line <= 0 || pages.size() - pages_index < line){
            console_message = "해당 line이 존재하지 않습니다.";
            return ;
        }
        if (index > pages[line - 1].size() - 1 || index < 0){
            console_message = "해당 index가 존재하지 않습니다.";
            return ;
        }
        pages[pages_index + line - 1].erase(pages[pages_index + line - 1].begin() + index);
        set_pages();
        console_message = command;
        return;
    }
    console_message = "d(line(int), index(int))형으로 입력해주세요.";
    return ;
}
};
```

- Delete 함수는 insert함수에서와 동일하게 먼저 정규표현식으로 들어온 명령의 형식이 맞는지 확인하고 이후 line과 index가 범위에 맞는지 확인하는 예외를 처리하게 구현하였습니다.
- 모든 예외사항을 통과했다면 수행가능한 명령이라는 의미이므로 벡터 라이브러리에 구현되어 있는 erase함수를 이용해서 해당부분에 있는 단어를 없애주었습니다.
- 단어를 삭제해줌으로 인해 콘솔이 다르게 출력이 되어야할수 있으므로 set_pages 함수를 이용해 words와 pages벡터를 새롭게 업데이트 해주었습니다.

5) Search : Execute 함수

```
104 class se : public commandKey
105 {
106 public:
107 void Execute()
108 {
109     regex re("s\\((\\w+)\\)");
110     smatch match;
111     if (regex_match(command, re)){
112         regex_search(((const string)command).begin(),((const string)command).end(), match, re);
113         if (match[1].length() > 75){
114             console_message = "최대 75바이트 까지만 입력할수 있습니다.";
115             return;
116         }
117         else{
118             for (int i = 0; i < pages.size(); i++){
119                 for (int j = 0; j < pages[i].size(); j++){
120                     if (pages[i][j] == match[1]){
121                         pages_index = i;
122                         console_message = command;
123                         return ;
124                     }
125                 }
126             }
127             console_message = "단어를 찾을수 없습니다.";
128             return;
129         }
130     }
131     console_message = "s(word) 형으로 입력해주세요.";
132     return ;
133 }
134 };
```

- Search 함수도 위의 두 함수와 마찬가지로 정규표현식을 이용하여 먼저 명령의 형식이 맞는지 확인을 하였습니다.
- 명령의 형식이 매개변수로 주어진 word가 75바이트가 넘는지를 확인하는 예외를 처리하게 구현하였습니다.
- 위 두가지의 예외처리를 모두 통과한 이후에는 전체 텍스트를 기준으로 word를 찾아야하기

때문에 pages벡터의 처음부터 word가 있는지를 확인하였습니다.

- 만약 있다면 해당 page의 인덱스를 반환해주고 pages를 모두 확인했는데도 해당 단어가 없다면 단어를 찾지 못했다는 메시지를 console_message에 넘겨주었습니다.
- 해당 page의 인덱스만 page_index에 저장해주면 콘솔창을 출력하는 것은 printPage 함수에서 page_index값을 이용해서 출력하는 것이기때문에 set_pages는 이용하지 않았습니다.

6) Change : Execute 함수

```
136 class change : public commandKey
137 {
138     public:
139     void Execute()
140     {
141         bool flag = false;
142         regex re("c\\((\\w+), (\\w+)\\)");
143         smatch match;
144         if (regex_match(command, re)){
145             regex_search(((const string)command).begin(), ((const string)command).end(), match, re);
146             if (match[1].length() > 75 || match[2].length() > 75){
147                 console_message = "최대 75바이트 까지만 입력할 수 있습니다.";
148                 return;
149             }
150             else{
151                 for (int i = 0; i < pages.size(); i++){
152                     for (int j = 0; j < pages[i].size(); j++){
153                         if (pages[i][j] == match[1]){
154                             flag = true;
155                             pages[i][j] = match[2];
156                         }
157                     }
158                 }
159             }
160             if (flag){
161                 console_message = command;
162                 set_pages();
163             }
164             else console_message = "단어를 찾을 수 없습니다.";
165             return;
166         }
167         console_message = "c(word,word) 형으로 입력해주세요.";
168         return ;
169     }
170 };
```

- Search 때와 마찬가지로 정규표현식을 이용하여 명령의 형식이 맞는지를 확인하였는데 change 함수는 search와 다르게 word가 2개가 들어가기 때문에 둘다 확인을 해주었습니다.
- Change 함수에서는 word를 찾았는지의 여부와 관계없이 항상 pages의 모든 요소를 방문해야 하기 때문에 flag 변수를 이용해서 word를 찾았는지 여부를 체크하였습니다.
- 만약 word를 찾았다면 flag = true로 바꿔주고 해당 word를 바꾸고자 하는 단어로 바꿔주었습니다.
- 모든 pages의 요소를 방문한 이후에도 flag가 false라면 단어가 없었다는 의미이므로 단어를 찾지 못했다는 메시지를 console_message에 넘겨주었습니다.

7) Exit : Execute 함수

```
class ex : public commandKey
{
public:
void Execute()
{
    console_message = command;
    saveTxt();
    cout << "exit" << endl;
    return ;
}
};
```

#saveTxt 함수는 3-12항목 참고

- Exit함수는 t가 입력되면 실행되는 함수인데, t를 입력하면 지금까지 변경사항을 텍스트에 저장하고 프로그램을 종료시키면 되서 saveTxt함수 이후에 return; 을 해주었습니다.

8) Next : Execute 함수

```
class ne : public commandKey
{
public:
void Execute()
{
    if (pages_index == pages.size() - 20){
        console_message = "이미 마지막 페이지 입니다.";
        return ;
    }
    else if (pages_index + 40 > pages.size()) pages_index = pages.size() - 20;
    else pages_index += 20;
    console_message = "다음 페이지";
    return ;
}
};
```

- 출력하는것 자체는 printPage함수에서 실행하고 있기때문에 next함수에서는 올바른 시작 page의 index를 pages_index에 저장해주기만 하면 됩니다.
- 전체 페이지가 5페이지고 마지막 페이지는 16줄이 있다고 가정하면 4페이지에서 next를 실행했을때 콘솔은 4페이지의 마지막 4줄 + 5페이지 16줄을 출력해야하기 때문에 이 부분을 예외 처리 해주었습니다.
- 이미 마지막 페이지인 경우 이미 마지막 페이지라는 메시지를 console_message에 넘겨주고 page_index는 바꿔주지 않고 return;을 해주었습니다.

9) Post : Execute 함수

```
class post : public commandKey
{
public:
void Execute()
{
    if (pages_index == 0){
        console_message = "이미 첫번째 페이지 입니다.";
        return ;
    }
    else if (pages_index - 20 < 0) pages_index = 0;
    else pages_index -= 20;
    console_message = "이전 페이지";
    return ;
}
};
```

- Post함수에서도 next때와 마찬가지로 pages_index만 값을 바꿔주고, 이미 첫번째 페이지인 경우 메시지를 console_message에 넘겨주었습니다.
- 현재 콘솔에서 출력되는 부분이 1페이지의 16번째 줄이라면 위에 4줄이 만나왔으므로 이때 post를 실행하면 1페이지의 처음부터 20줄이 나오게 구현하였습니다.

10) Print page 함수

```
void printPage()
{
    int k = 0;
    for (int i = pages_index; i < pages_index + 20 && i < pages.size(); i++){
        k++;
        if (k < 10) cout << " " << k << "| ";
        else cout << k << "| ";
        for (int j = 0; j < pages[i].size(); j++){
            cout << pages[i][j] << " ";
        }
        cout << endl;
    }
}
```

- printPage 함수에서는 현재 page_index에 따라서 콘솔창에 텍스트를 출력해줍니다.
- Line당 75바이트 이하로 출력해야하는 것은 page를 구성하면서 이미 예외처리를 해주었기때문에 page의 해당 라인을 출력하는 기능만 수행하면 됩니다.
- 줄을 맞추기 위해 line의 숫자가 한자리인 경우와 2자리인 경우를 나누어서 생각하였습니다.

11) Set_pages 함수

```
void set_pages()
{
    vector<string> lines;
    int len = 0;
    words.clear();
    for (int i = 0; i < pages.size(); i++){
        for (int j = 0; j < pages[i].size(); j++){
            words.push_back(pages[i][j]);
        }
    }
    pages.clear();
    for (int i = 0; i < words.size(); i++){
        if (len + words[i].length() > 75){
            pages.push_back(lines);
            lines.clear();
            lines.push_back(words[i]);
            len = words[i].length();
        }
        else{
            len += words[i].length();
            lines.push_back(words[i]);
        }
    }
    pages.push_back(lines);
}
```

- Set_pages 함수에서는 words벡터와 pages 벡터를 업데이트 해줍니다.
- Command 함수들에 의해 콘솔의 출력값이 바뀔경우(del, change, insert ...) Command의 함수 실행 이후에 바로 print_Page를 하면 새롭게 줄바꿈이 되어야 하거나 줄이 합쳐져서 다시 출력해야 하는 경우의 처리를 못하기 때문에 set_page로 words 벡터와 pages벡터를 업데이트를 해준 이후에 print_Page를 해주게끔 구현하였습니다.
- Command 함수가 실행된 이후에는 단어들의 구성은 맞지만 해당 라인이 아닌경우가 있기때문에 일단 words벡터에 모든 단어를 저장해줍니다.
- 이후에 그 words벡터를 이용해서 make_pages함수때와 마찬가지로 pages를 다시 업데이트 해줍니다.
- 이렇게 되면 print_page함수를 실행하더라도 이미 모두 업데이트가 된 상태이기 때문에 조건에 알맞게 출력을 할수 있게 됩니다.

12) saveTxt 함수

```
void saveTxt(){
    ofstream out("test.txt");
    for(int i=0; i < words.size(); i++){
        out << words[i] << " ";
    }
    out.close();
}
```

- 저장해야하는 모든 내용은 words와 pages 벡터에 저장되어 있기때문에 둘중 하나를 이용해서 텍스트의 내용을 업데이트 해주면 됩니다.

13) CommandHandler 클래스

```
class CommandHandler
{
private:
    vector<CommandKey*> commands;

public:
    void addCommand(CommandKey *command){
        commands.push_back(command);
    }

    bool Execute(char key){
        vector<CommandKey*>::iterator start = commands.begin();
        vector<CommandKey*>::iterator end = commands.end();

        while (start != end){
            if ((*start)->IsEqual(key)){
                (*start)->Execute();
                return true;
            }
            start++;
        }
        return false;
    }
};
```

- CommandHandler 클래스에서는 Command를 Commands 벡터에 저장해서 관리합니다.
- CommandHandler에서 Execute함수는 입력받은 key를 commands 벡터에서 찾아서 해당 Command의 execute를 실행하게 구현하였습니다.
- 이때, 입력받은 key가 유효하지 않다면(Commands벡터에 저장되어 있지 않다면) false를 반환하게 됩니다.

4. 실행결과

1) 첫페이지 이후 정상 종료

```
+ OOP_Term git:(master) * g++ main.cpp
+ OOP_Term git:(master) * ./a.out
1| The Supreme Court on Monday let stand a ruling by Pennsylvania's highest court that
2| allowed election officials to count some mailed ballots received up to three days after
3| Election Day. The state is a key battleground in the presidential election. The Supreme
4| Court's action was the result of a deadlock. It takes five votes to grant a stay, and the
5| Republicans who had asked the court to intervene could muster only four: Justices
6| Clarence Thomas, Samuel A. Alito Jr., Neil M. Gorsuch and Brett M. Kavanaugh. On the other
7| side of the divide were Chief Justice John G. Roberts Jr. and the court's three-member
8| liberal wing: Justices Stephen G. Breyer, Sonia Sotomayor and Elena Kagan. Neither side
9| gave reasons. The result suggested that Judge Amy Coney Barrett, whom President Trump
10| nominated to replace Justice Ruth Bader Ginsburg after her death last month, could play a
11| decisive role in election disputes. Judge Barrett is expected to be confirmed next week.
12| The Pennsylvania Supreme Court ruled that the three-day extension was required by the
13| coronavirus pandemic and delays in mail service, and it ordered the counting of ballots
14| clearly mailed on or before Election Day and of those with missing or illegible postmarks
15| "unless a preponderance of the evidence demonstrates that it was mailed after
16| Election Day." The ruling is a major victory for Democrats in the state who have been
17| pushing to expand access to voting in the pandemic, and for a party that has been
18| requesting absentee ballots in far greater numbers than Republicans. As of Friday,
19| Democrats in Pennsylvania had requested 1,755,940 ballots, and Republicans had
20| requested 672,381, according to the Pennsylvania secretary of state's office. Of

n:다음 페이지, p:이전 페이지, i:삽입, d:삭제, c:변경, s:찾기, t:저장 후 종료

(콘솔 메시지)
입력: t
exit
```

2) 마지막 페이지 13줄 + 현재 페이지 7줄 출력하는 경우

```
입력: n

1| trickier to figure out how to cast your ballot. Here's a state-by-state guide to make
2| sure your vote is counted. Three Main Ways to Vote: We may be in the midst of a pandemic, but
3| whether you vote in person on Election Day, a few weeks early, or prefer to mail in your
4| ballot this year, it can still be a straightforward process. Do You Still Have Time?:
5| Voters in 35 states can request ballots so close to Election Day that it may not be feasible
6| for their ballots to be mailed to them and sent back to election officials in time to be
7| counted. Here's a list of states where it's risky to procrastinate. Fact-Checking
8| the Falsehoods: Voters are facing a deluge of misinformation about voting by mail, some
9| prompted by the president. Here's the truth about absentee ballots. "Extending the
10| date by which ballots may be cast by voters - not just received by the municipal clerks
11| but cast by voters - for an additional six days after the scheduled Election Day
12| fundamentally alters the nature of the election," the unsigned opinion in the
13| Wisconsin case said. Sign up to receive our On Politics newsletter, a daily guide to the
14| political news cycle. Rulings from state courts present more difficult questions, as
15| the Supreme Court generally defers to them in cases concerning interpretations of state
16| law and the Constitution empowers state legislatures to set the times, places and manner
17| of congressional elections. In a second brief, the Republican Party of Pennsylvania
18| argued that "the Constitution reserves a special role for state legislatures in federal
19| elections," one that cannot be overridden by state courts. The brief relied heavily on
20| the Supreme Court's decision in the cases culminating in Bush v. Gore, the 2000 ruling

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(콘솔 메시지) 다음 페이지
입력: n

1| political news cycle. Rulings from state courts present more difficult questions, as
2| the Supreme Court generally defers to them in cases concerning interpretations of state
3| law and the Constitution empowers state legislatures to set the times, places and manner
4| of congressional elections. In a second brief, the Republican Party of Pennsylvania
5| argued that "the Constitution reserves a special role for state legislatures in federal
6| elections," one that cannot be overridden by state courts. The brief relied heavily on
7| the Supreme Court's decision in the cases culminating in Bush v. Gore, the 2000 ruling
8| that handed the presidency to George W. Bush. "By extending the deadline by judicial
9| fiat and establishing a presumption of timeliness that will allow voters to cast or mail
10| ballots after Election Day," the brief said, "the Pennsylvania Supreme Court has
11| impermissibly altered both the 'time' and 'manner' established by the General
12| Assembly" for conducting elections. In response, Josh Shapiro, Pennsylvania's
13| attorney general, a Democrat, said a provision of the State Constitution protecting
14| "free and equal elections" allowed the Pennsylvania Supreme Court to extend the
15| deadline. He added that the state court's decision was "consistent with how
16| Pennsylvania law handles military and overseas ballots timely cast but not received
17| until after Election Day." Later Monday, in Tennessee, a federal appeals court
18| exempted first-time voters from having to appear in person at the polls on Nov. 3 if they
19| registered online or by mail, as required by a state law, which critics said would
20| endanger residents during the pandemic.

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(콘솔 메시지) 다음 페이지
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3) 마지막페이지에서 next 실행

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입력 : n
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1 political news cycle. Rulings from state courts present more difficult questions, as
2 the Supreme Court generally defers to them in cases concerning interpretations of state
3 law and the Constitution empowers state legislatures to set the times, places and manner
4 of congressional elections. In a second brief, the Republican Party of Pennsylvania
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15 deadline. He added that the state court's decision was "consistent with how
16 Pennsylvania law handles military and overseas ballots timely cast but not received
17 until after Election Day." Later Monday, in Tennessee, a federal appeals court
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-----
(콘솔 메시지) 이미 마지막 페이지입니다.
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입력 :

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4) 현재 페이지 7줄 + 첫번째 페이지 13줄 실행하는 경우

```

1 clearly mailed on or before Election Day and of those with missing or illegible postmarks
2 "unless a preponderance of the evidence demonstrates that it was mailed after
3 Election Day." The ruling is a major victory for Democrats in the state who have been
4 pushing to expand access to voting in the pandemic, and for a party that has been
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6 Democrats in Pennsylvania had requested 1,755,940 ballots, and Republicans had
7 requested 672,381, according to the Pennsylvania secretary of state's office. Of
8 course, it could result in further delays in reporting results. Pennsylvania is already
9 expected to be one of the last states to report, with a statewide law preventing election
10 officials from beginning to process ballots until Election Day and Republicans in the
11 state legislature indicating that they will not give them more time. The decision also
12 removes one more legal hurdle facing elections in Pennsylvania, where numerous
13 voting-related lawsuits are undecided, including whether election officials will
14 have to perform signature matching on absentee ballots. Two Republican state lawmakers
15 and the Republican Party of Pennsylvania asked the U.S. Supreme Court to block the state
16 court's treatment of ballots without legible postmarks. The lawmakers wrote that the
17 state court's ruling was "an open invitation to voters to cast their ballots after
18 Election Day, thereby injecting chaos and the potential for gamesmanship into what was
19 an orderly and secure schedule of clear, bright-line deadlines." "In a year where
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-----
(콘솔 메시지) 이전 페이지
-----
입력 : p
-----
1 The Supreme Court on Monday let stand a ruling by Pennsylvania's highest court that
2 allowed election officials to count some mailed ballots received up to three days after
3 Election Day. The state is a key battleground in the presidential election. The Supreme
4 Court's action was the result of a deadlock. It takes five votes to grant a stay, and the
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(콘솔 메시지) 이전 페이지
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입력 : p

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5) 첫번째 페이지에서 post 실행한 경우

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입력 : p
1 The Supreme Court on Monday let stand a ruling by Pennsylvania's highest court that
2 allowed election officials to count some mailed ballots received up to three days after
3 Election Day. The state is a key battleground in the presidential election. The Supreme
4 Court's action was the result of a deadlock. It takes five votes to grant a stay, and the
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(콘솔 메시지) 이미 첫번째 페이지입니다.

입력 :

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6) 첫번째 페이지 2번째줄 13번째 단어 이후에 testtest단어 insert

```

입력 : i(2,13,testtest)
1 The Supreme Court on Monday let stand a ruling by Pennsylvania's highest court that
2 allowed election officials to count some mailed ballots received up to three days after
3 Election Day. The state is a key battleground in the presidential election. The Supreme
4 Court's action was the result of a deadlock. It takes five votes to grant a stay, and the
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16 Election Day." The ruling is a major victory for Democrats in the state who have been
17 pushing to expand access to voting in the pandemic, and for a party that has been
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(콘솔 메시지) 이미 첫번째 페이지입니다.

입력 : i(2,13,testtest)
1 The Supreme Court on Monday let stand a ruling by Pennsylvania's highest court that
2 allowed election officials to count some mailed ballots received up to three days after
3 Election Day. The state is a key battleground in the presidential election. The Supreme
4 Court's action was the result of a deadlock. It takes five votes to grant a stay, and the
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15 "unless a preponderance of the evidence demonstrates that it was mailed after
16 Election Day." The ruling is a major victory for Democrats in the state who have been
17 pushing to expand access to voting in the pandemic, and for a party that has been
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(콘솔 메시지) i(2,13,testtest)

입력 :

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7) 두번째 페이지 10번째 줄 4번째 단어 delete

```

1 Pennsylvania secretary of state's office. Of course, it could result in further
2 delays in reporting results. Pennsylvania is already expected to be one of the last
3 states to report, with a statewide law preventing election officials from beginning to
4 process ballots until Election Day and Republicans in the state legislature indicating
5 that they will not give them more time. The decision also removes one more legal hurdle
6 facing elections in Pennsylvania, where numerous voting-related lawsuits are
7 undecided, including whether election officials will have to perform signature
8 matching on absentee ballots. Two Republican state lawmakers and the Republican Party
9 of Pennsylvania asked the U.S. Supreme Court to block the state court's ruling
10 ballots without legible postmarks. The lawmakers wrote that the state court's ruling
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12 injecting chaos and the potential for gamesmanship into what was an orderly and secure
13 schedule of clear, bright-line deadlines." "In a year where there is a very real
14 possibility that the final presidential election result hinges on Pennsylvania, the
15 new rules imposed by the decision of the Supreme Court of Pennsylvania (a body elected in
16 partisan elections) could destroy the American public's confidence in the electoral
17 system as a whole," the brief said. The U.S. Supreme Court has not hesitated to block
18 orders from federal judges that sought to alter state rules for conducting elections. In
19 April, for instance, the justices, dividing 5 to 4, overturned a federal judge's order
20 that had lengthened a deadline for absentee voting in Wisconsin. How to Vote: Many voting

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(콘솔 메시지) 다음 페이지

입력 : d(10,4)
1 Pennsylvania secretary of state's office. Of course, it could result in further
2 delays in reporting results. Pennsylvania is already expected to be one of the last
3 states to report, with a statewide law preventing election officials from beginning to
4 process ballots until Election Day and Republicans in the state legislature indicating
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(콘솔 메시지) d(10,4)

입력 :

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8) 첫번째 페이지 that > test123123 으로 change

```

1 The Supreme Court on Monday let stand a ruling by Pennsylvania's highest court that
2 allowed election officials to count some mailed ballots received up to three days
3 testtest after Election Day. The state is a key battleground in the presidential
4 election. The Supreme Court's action was the result of a deadlock. It takes five votes
5 to grant a stay, and the Republicans who had asked the court to intervene could muster only
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(콘솔 메시지)
입력 : c(that,test123123)

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9) 6번에서 insert했던 testtest단어 search

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입력 : s(testtest)

11 days testtest after Election Day. The state is a key battleground in the presidential
21 election. The Supreme Court's action was the result of a deadlock. It takes five votes
31 to grant a stay, and the Republicans who had asked the court to intervene could muster only
41 four: Justices Clarence Thomas, Samuel A. Alito Jr., Neil M. Gorsuch and Brett M.
51 Kavanaugh. On the other side of the divide were Chief Justice John G. Roberts Jr. and the
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151 major victory for Democrats in the state who have been pushing to expand access to voting
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(콘솔 메시지) s(testtest)
입력 :

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10) 종료 후 저장되었는지 확인

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입력 : t

exit
+ OOP_Term git:(master) x ./a.out
1 The Supreme Court on Monday let stand a ruling by Pennsylvania's highest court
21 test123123 allowed election officials to count some mailed ballots received up to three
31 days testtest after Election Day. The state is a key battleground in the presidential
41 election. The Supreme Court's action was the result of a deadlock. It takes five votes
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(콘솔 메시지)
입력 :

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A. Line 초과, index 초과

B. 정규식에 맞지않는 명령입력, word가 75바이트 초과

A. Line 초과

입력 : d(21,1)

1 The Supreme Court on Monday let stand a ruling by Pennsylvania's highest court
2 test123123 allowed election officials to count some mailed ballots received up to three
3 days testest after Election Day. The state is a key battleground in the presidential
4 election. The Supreme Court's action was the result of a deadlock. It takes five votes
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15 and of those with missing or illegible postmarks "unless a preponderance of the
16 evidence demonstrates test123123 it was mailed after Election Day." The ruling is a
17 major victory for Democrats in the state who have been pushing to expand access to voting
18 in the pandemic, and for a party test123123 has been requesting absentee ballots in far
19 greater numbers than Republicans. As of Friday, Democrats in Pennsylvania had
20 requested 1,755,940 ballots, and Republicans had requested 672,381, according to the

n:다음페이지, p:이전페이지, l:삽입, d:삭제, c:변경, s:찾기, t:저장후종료

(콘솔 메시지) 해당 line이 존재하지 않습니다.

B. Index 초과

원격 : d(12,21)

1 The Supreme Court on Monday let stand a ruling by Pennsylvania's highest court
2 test123123 allowed election officials to count some mailed ballots received up to three
3 days testtest after Election Day. The state is a key battleground in the presidential
4 election. The Supreme Court's action was the result of a deadlock. It takes five votes
5 to grant a stay, and the Republicans who had asked the court to intervene could muster only
6 four: Justices Clarence Thomas, Samuel A. Alito Jr., Neil M. Gorsuch and Brett M.
7 Kavanaugh. On the other side of the divide were Chief Justice John G. Roberts Jr. and the
8 court's three-member liberal wing: Justices Stephen G. Breyer, Sonia Sotomayor and
9 Elena Kagan. Neither side gave reasons. The result suggested test123123 Judge Amy Coney
10 Barrett, whom President Trump nominated to replace Justice Ruth Bader Ginsburg after
11 her death last month, could play a decisive role in election disputes. Judge Barrett is
12 expected to be confirmed next week. The Pennsylvania Supreme Court ruled test123123 the
13 three-day extension was required by the coronavirus pandemic and delays in mail
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[콘솔 메시지] 해당 index가 존재하지 않습니다

C. 정규식에 맞지 않는 명령 입력

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1 The Supreme Court on Monday let stand a ruling by Pennsylvania's highest court
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20 requested 1,755,948 ballots, and Republicans had requested 672,381, according to the

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[콘솔 메시지] d(line(int), index(int))형으로 입력해주세요 .

3) Change

A. 75바이트 넘는 경우

입력 : c(ccccccccccc) testtest after Election Day. The state is a key battleground in the presidential election. The Supreme Court's action was the result of a deadlock. It takes five votes to grant a stay, and the Republicans who had asked the court to intervene could muster only four: Justices Clarence Thomas, Samuel A. Alito Jr., Neil M. Gorsuch and Brett M. Kavanaugh. On the other side of the divide were Chief Justice John G. Roberts Jr. and the court's three-member liberal wing: Justices Stephen G. Breyer, Sonia Sotomayor and Elena Kagan. Neither side gave reasons. The result suggested test123123 Judge Amy Coney Barrett, whom President Trump nominated to replace Justice Ruth Bader Ginsburg after her death last month, could play a decisive role in election disputes. Judge Barrett is expected to be confirmed next week. The Pennsylvania Supreme Court ruled test123123 the three-day extension was required by the coronavirus pandemic and delays in mail service, and it ordered the counting of ballots clearly mailed on or before Election Day and of those with missing or illegible postmarks "unless a preponderance of the evidence demonstrates test123123 it was mailed after Election Day." The ruling is a major victory for Democrats in the state who have been pushing to expand access to voting in the pandemic, and for a party test123123 has been requesting absentee ballots in far greater numbers than Republicans. As of Friday, Democrats in Pennsylvania had requested 1,755,940 ballots, and Republicans had requested 672,381, according to the

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(콘솔 메시지) 최대 75바이트 까지만 입력할 수 있습니다 .

B. 단어를 찾지 못한 경우

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입력 : c(helloworld,word)

1| The Supreme Court on Monday let stand a ruling by Pennsylvania's highest court
2| test123123 allowed election officials to count some mailed ballots received up to three
3| days testtest after Election Day. The state is a key battleground in the presidential
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(콘솔 메시지) 단어를 찾을 수 없습니다.
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4) Search

A. 찾는 단어가 마지막 페이지에 있는 경우

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입력 : s(registered)

1| registered online or by mail, as required by a state law, which critics said would
2| endanger residents during the pandemic.

n:다음 페이지, p:이전 페이지, i:삽입, d:삭제, c:변경, s:찾기, t:저장 후 종료
(콘솔 메시지) s(registered)
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B. 찾는 단어가 없는 경우

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입력 : s(helloworld)

1| unsigned opinion in the Wisconsin case said. Sign up to receive our On Politics
2| newsletter, a daily guide to the political news cycle. Rulings from state courts present
3| more difficult questions, as the Supreme Court generally defers to them in cases
4| concerning interpretations of state law and the Constitution empowers state
5| legislatures to set the times, places and manner of congressional elections. In a second
6| brief, the Republican Party of Pennsylvania argued test123123 "the Constitution
7| reserves a special role for state legislatures in federal elections," one test123123
8| cannot be overridden by state courts. The brief relied heavily on the Supreme Court's
9| decision in the cases culminating in Bush v. Gore, the 2000 ruling test123123 handed the
10| presidency to George W. Bush. "By extending the deadline by judicial fiat and
11| establishing a presumption of timeliness test123123 will allow voters to cast or mail
12| ballots after Election Day," the brief said, "the Pennsylvania Supreme Court has
13| impermissibly altered both the 'time' and 'manner' established by the General
14| Assembly" for conducting elections. In response, Josh Shapiro, Pennsylvania's
15| attorney general, a Democrat, said a provision of the State Constitution protecting
16| "free and equal elections" allowed the Pennsylvania Supreme Court to extend the
17| deadline. He added test123123 the state court's decision was "consistent with how
18| Pennsylvania law handles military and overseas ballots timely cast but not received
19| until after Election Day." Later Monday, in Tennessee, a federal appeals court
20| exempted first-time voters from having to appear in person at the polls on Nov. 3 if they

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(콘솔 메시지) 단어를 찾을 수 없습니다.
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