

객체지향설계 Term project

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구현 중 편의를 위해 기존 과제 내용과 다르게 구현한 점입니다.

※ c(hello,bye): 대신 r(hello,bye) 사용

※ d(2,10): 현재 페이지가 아닌, 전체 라인 중 2번째 라인의 10번째 단어 삭제

e.g. d(52,2): 전체 라인 중 52번째 라인의 2번째 단어 삭제

※ i(1,10,hello): 현재 페이지가 아닌, 전체 라인 중 1번째 라인의 10번째 단어 뒤에 "hello" 삽입

e.g. i(26,12,yo): 전체 라인 중 26번째 라인의 12번째 단어 뒤에 "yo" 삽입

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1. 적용한 디자인 패턴: Factory.

- 선정 이유

향후 콘솔 기반 편집기의 가장 유망한 확장 사항은 명령의 추가/삭제 및 변경으로 봄.

→ 명령 업데이트 시 메인 함수 또한 변경해야 하는 문제를 피하기 위해 Factory 채택.

그리고 다른 패턴은 다음과 같은 이유로 불필요하다 판단

Design pattern	Reason for avoiding use
Singleton	여러 객체가 공유 사용하는 글로벌 객체가 없음
Builder	복잡하고 동적으로 여러 인스턴스가 생성될 수도 있는 객체가 없음
Adapter	변환이 필요한 대상이 없음
Strategy	동적으로 "전략"을 바꾸면서까지 수행해야 좋을 법한 상황 찾지 못함 예를 들어, 실행 중 사용자의 선호에 따라 편집기의 가로(75 byte) 세로 (20 byte) 제한을 변경 할 수도 있지만 단순 가로, 세로의 제한 크기가 바뀔 뿐 편집기가 그 크기 제한 만큼 텍스트를 출력한다는 동작은 전혀 바뀌지 않음. 따라서 이 케이스의 경우 strategy를 적용 하는 것보단 가로 세로 인자만 바꿀 수 있으면 된다고 판단. 또 다른 예로 사용자의 선호에 따라 같은 i(1,10,hello)라도 10번째 단어 "뒤"가 아닌 "앞"에 단어를 추가할 수 있는 기능을 추가해야 한다면 strategy 패턴이 적절하다 생각되지만, 이 경우 프로그램의 유지 보수 편리성을 위해 strategy를 적용한다기보단 strategy의 적용을 위해 케이스를 억지로 짜낸 느낌
Observer	동적으로 구독, 구독 취소가 필요한 경우가 없음

- 목표

Factory 패턴의 본래 예제

: API <-> Client 분리 → API가 변경되어도 Client는 코드를 변경하지 않아도 됨

본 과제에 적용한 Factory 패턴의 목표

: 명령 해석 <-> 실행 분리 → 명령이 변경되어도 실행 측의 코드엔 영향이 없도록

- 구현 방법

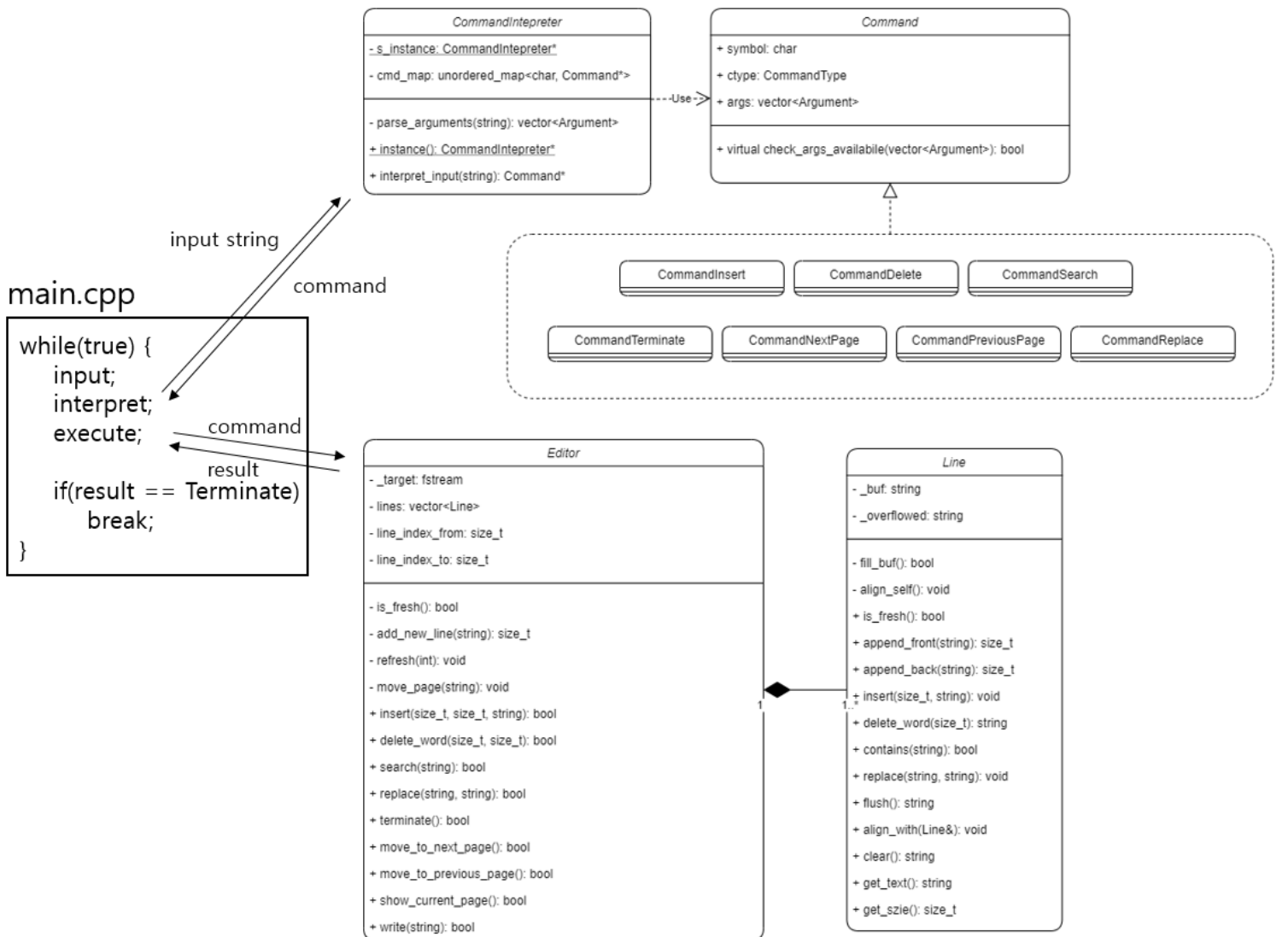
Main에서 입력 string 값만 넘겨주면 해석된 Command를 받을 수 있도록 함.

Command를 해석한다는 의미는 Argument parsing, Type checking을 뜻하며 이를 담당하는 'CommandInterpreter' Class를 정의. 즉, Main은 사용자 입력 값의 인자 파싱 및 유효성 검증을 CommandInterpreter에게 맡기고, 검증된 Command 만을 받을 수 있다.

→ Main은 Command의 종류만 알면 되고, 해석된 Command에 따라 원하는 작업을 정의

2. 프로그램 구조

- 클래스 다이어그램 및 프로그램 실행 구조



- 주요 코드 설명

1. main.cpp

```

main() {
try {
    // Load text file
    Editor editor(FILE_READ);

    string input;
    string console_msg = "Hi!";
    while (true) {
        try {
            UI::printInterface(editor, console_msg);

            input = UI::input();
            Command* cmd = CommandInterpreter::instance()->interpret_input(input);

            if (execute_command(cmd, editor)) {
                console_msg = input + " success";
                if (cmd->ctype == TERMINATE) {
                    cout << "Terminated!" << endl;
                    break;
                }
            } else {
                console_msg = input + " failed";
            }
        }
        catch (invalid_argument& e) {
            console_msg = "Invalid input: "+input + " <--- err msg: "+ e.what()
        }
        catch (out_of_range& e) {
            console_msg = "Invalid input: "+input + " <--- err msg: "+ e.what()
        }
    }
}
}

```

- 텍스트 및 UI 출력

입력 및 명령 해석

명령 실행

```

bool execute_command(Command* cmd, Editor& e) {
    vector<Argument> args = cmd->args;

    // Execute
    switch(cmd->ctype)
    {
        case INSERT: // e.g. i(1,10,hello)
            return e.insert(args[0], args[1], args[2]);
        case DELETE: // e.g. d(2,10)
            return e.delete_word(args[0], args[1]);
        case SEARCH: // e.g. s(hello)
            return e.search(args[0]);
        case REPLACE: // e.g. r(hello,bye)
            return e.replace(args[0], args[1]);
        case TERMINATE: // No args e.g. t
            e.write(FILE_WRITE);
            return e.terminate();
        case NEXT_PAGE: // No args e.g. n
            return e.move_to_next_page();
        case PREVIOUS_PAGE: // No args e.g. p
            return e.move_to_previous_page();
        case UNDEFINED:
            break;
    }
    return false;
}

```

2. CommandInterpreter.cpp

```

CommandInterpreter::CommandInterpreter() {
    // [args] in [Command] is empty at the first time.
    // It will be filled in 'fill_cargs()'
    vector<Command*> vec;
    vec.push_back(new CommandInsert());
    vec.push_back(new CommandDelete());
    vec.push_back(new CommandSearch());
    vec.push_back(new CommandReplace());
    vec.push_back(new CommandTerminate());
    vec.push_back(new CommandNextPage());
    vec.push_back(new CommandPreviousPage());

    for (auto it = vec.begin(); it!=vec.end(); ++it) {
        cmd_map[(*it)->symbol] = *it;
    }
}

CommandInterpreter::~CommandInterpreter() {
    // Deallocate all [Command] allocated in constructor
    for(auto it = cmd_map.begin(); it!=cmd_map.end(); ++it) {
        delete(it->second); // delete value
    }
}

Command* CommandInterpreter::interpret_input(string input) {
    Command* cmd = cmd_map[input.at(0)];
    if (cmd==nullptr)
        throw invalid_argument("There is no command with that symbol");

    vector<Argument> args = parseArguments(input.substr(1, input.size()));
    if (!cmd->check_args_available(args)) {
        throw invalid_argument("Arguments doesn't matched for its command type");
    }

    cmd->args = args;
    return cmd;
};

CommandInterpreter* CommandInterpreter::s_instance = 0;

```

명령 정보 초기화

명령 종류 해석

인자 파싱 및 유효성 검증

검증된 인자를 가진 Command 반환

command/Command.hpp

```

class CommandDelete: public Command {
public:
    CommandDelete() {
        symbol = 'd';
        ctype = DELETE;
    };

    virtual bool check_args_available(vector<Argument> args) override {
        size_t size = args.size();
        return size==2 && args[0].type==INTEGER && args[1].type==INTEGER;
    }
};

```

명령 별 인자 검증 함수 호출

3. Editor.cpp

```
class Editor {    You, 5 days ago • Initialize term project
private:
    fstream target;
    vector<Line> lines;
    size_t lineIndexFrom; // First line index that shown by editor
    size_t lineIndexTo;   // Last line index that shown by editor
```

- 편집기의 모든 라인 (1 라인 당 1 Line 객체를 의미)
- 사용자에게 보여질 첫 번째 라인 번호
- 사용자에게 보여질 마지막 라인 번호

Editor의 각 operation은 Line의 operation으로 구성됨

```
bool Editor::insert(size_t line_num, size_t word_num, string word) {
    // TODO: out of index error (If line_num <= 0)
    if (line_num < 1 || word_num < 1) {
        throw out_of_range("Line and word number should larger than 0.");
    }
    if (line_num > lines.size()) {
        throw out_of_range("The line number you entered does not exist");
    }
    lines[line_num-1].insert(word_num, word);
    refresh(line_num-1);
    return true;
};
```

```
bool Editor::delete_word(size_t line_num, size_t word_num) {
    // TODO: out of index error (If line_num < 1)
    if (line_num < 1 || word_num < 1) {
        throw out_of_range("Line and word number should larger than 0.");
    }
    if (line_num > lines.size()) {
        throw out_of_range("The line number you entered does not exist");
    }
    lines[line_num-1].delete_word(word_num);
    refresh(line_num-1);
    return true;
}
```

```
bool Editor::search(string target) {
    size_t ix = 0;
    for(vector<Line>::iterator it= lines.begin(); it!=lines.end(); ++it) {
        if ((*it).contains(target)) {
            this->move_page(ix);
            return true;
        }
        ++ix;
    }
    return false;
}
```

```
bool Editor::replace(string src, string dest) {
    for(vector<Line>::iterator it= lines.begin(); it!=lines.end(); ++it) {
        (*it).replace(src, dest);
    }
    refresh();
    return true;
}
```

```
bool Editor::move_to_next_page() {
    lineIndexTo = min(lines.size(), lineIndexTo + LINE_LIMIT_PER_PAGE);
    lineIndexFrom = max(0, (int)(lineIndexTo - LINE_LIMIT_PER_PAGE));
    return true;
}
```

```
bool Editor::move_to_previous_page() {
    lineIndexFrom = max(0, (int)(lineIndexFrom - LINE_LIMIT_PER_PAGE));
    lineIndexTo = min(lines.size(), lineIndexFrom + LINE_LIMIT_PER_PAGE);
    return true;
}
```

```
bool Editor::show_current_page() {
    printf("\n\n\n");
    printf("(Line %d-%d / %d)\n", lineIndexFrom+1, lineIndexTo, lines.size());
    vector<Line>::iterator it = lines.begin() + lineIndexFrom;
    vector<Line>::iterator end = lines.begin() + min(lines.size(), lineIndexTo);

    size_t line_num = lineIndexFrom+1;
    while (it != end) {
        printf("%2d| %-75s --- len: %d\n", line_num++, (*it).get_text().c_str(), (*it).get_size());
        ++it;
    }
    return true;
}
```

```
bool Editor::terminate() {
    // TODO: Save
    return true;
}
```

4. Line.cpp

```
class Line {
private:
    string _buf;
    string _overflowed;
```

- 유효한 텍스트를 위한 버퍼(75 byte 이하를 지향)
- 넘친 텍스트를 위한 버퍼

_buf가 꽉 채워지지 않았으면 _overflowed에서 가져와 채우고,

_buf가 넘치면 _overflowed로 쏜다.

그리고 다음 줄의 Line 객체와 협업을 통해 서로 텍스트를 옮기며 명령에 맞게 수행

Line 객체의 insert(), delete(), replace() 등은 _buf에서 해당 동작을 수행한 후 필요에 따라 아래 fill_buf(), align_self()를 이용하여 텍스트 정보가 꼬이지 않도록 최신화한다.

```
class Line {
private:
    string _buf;
    string _overflowed;

    /**
     * Fill own buffer using own overflowed string
     * @return return value description
     * @example
     *   before   buf:abc___ , of:dheee
     *   after    buf:abcdhe , of:ee
     * @invariant
     *   #Line_fresh => #Line_fresh
     *   #buf_fresh => #buf_fresh
     */
    bool fill_buf() {
        if (_buf.size() <= BYTE_LIMIT_PER_LINE) {
            return false;
        }

        size_t found = _buf.rfind(" ");
        if (found == string::npos) {
            throw std::out_of_range("Each word must be smaller than {} bytes!");
        }

        while (found >= BYTE_LIMIT_PER_LINE) { found = _buf.rfind(" ", found-1); }

        // before: _buf: "a", of: "b"
        // after:  _buf: "a ", of: "b"
        found = found + 1;
        string overflowed = _buf.substr(found);
        _buf.erase(found);
        _overflowed.append(overflowed);
        return true;
    }
};
```

예시

fill_buf()

_buf에서 더 채울 수 있는 만큼
_overflowed에서 가져와 채운다.

```
/**
 * Align itself. Fill own buffer using own overflowed string
 *
 * @param p p description
 * @return return value description
 * @example
 *   before   buf:abc___ , of:dheee
 *   after    buf:abcdhe , of:ee
 *
 *   before   buf:abcdhe(fff) , of:
 *   after    buf:abcdhe , of:fff
 * @invariant
 *   _ => #buf_fresh (validated)
 */
void align_self() {
    string all = this->clear();
    this->append_back(all);
}
```

예시

align_self()

내부적으로 fill_buf()를 이용하여
자신의 buf를 조정한다.
(부족하면 채우고, 넘치면 뺌)

3. 실행 스크린 샷

- 초기화면

```
seungminjeon@as123456-HPE-390kr:~/Desktop/study/CSE_000/Term/build$ ./TextEditor
hi!
-----

(Line 1~20 / 84)
1| The Supreme Court's action was the result of a deadlock. It takes five --- len: 73
2| votes to grant a stay, and the Republicans who had asked the court to --- len: 70
3| intervene could muster only four: Justices Clarence Thomas, Samuel A. --- len: 70
4| Alito Jr., Neil M. Gorsuch and Brett M. Kavanaugh. On the other side of --- len: 72
5| the divide were Chief Justice John G. Roberts Jr. and the court's --- len: 68
6| three-member liberal wing: Justices Stephen G. Breyer, Sonia Sotomayor and --- len: 75
7| Elena Kagan. Neither side gave reasons. The result suggested that Judge --- len: 72
8| Amy Coney Barrett, whom President Trump nominated to replace Justice Ruth --- len: 74
9| Bader Ginsburg after her death last month, could play a decisive role in --- len: 73
10| election disputes. Judge Barrett is expected to be confirmed next week. --- len: 72
11| The Pennsylvania Supreme Court ruled that the three-day extension was --- len: 70
12| required by the coronavirus pandemic and delays in mail service, and it --- len: 72
13| ordered the counting of ballots clearly mailed on or before Election Day --- len: 73
14| and of those with missing or illegible postmarks "unless a preponderance --- len: 75
15| of the evidence demonstrates that it was mailed after Election Day." The --- len: 75
16| ruling is a major victory for Democrats in the state who have been pushing --- len: 75
17| to expand access to voting in the pandemic, and for a party that has been --- len: 74
18| requesting absentee ballots in far greater numbers than Republicans. As of --- len: 75
19| Friday, Democrats in Pennsylvania had requested 1,755,940 ballots, and --- len: 71
20| Republicans had requested 672,381, according to the Pennsylvania secretary --- len: 75
-----

(n)ext page, (p)revious page, (i)nsert word, (d)elele word, (r)eplace words, (s)earch word, (t)erminate and save.
-----

[Console] Hi!
-----

Input: |
```

- i(1,10,hello)

```
(Line 1~20 / 84)
1| The Supreme Court's action was the result of a deadlock. hello It takes --- len: 74
2| five votes to grant a stay, and the Republicans who had asked the court to --- len: 75
3| intervene could muster only four: Justices Clarence Thomas, Samuel A. --- len: 70
4| Alito Jr., Neil M. Gorsuch and Brett M. Kavanaugh. On the other side of --- len: 72
5| the divide were Chief Justice John G. Roberts Jr. and the court's --- len: 68
6| three-member liberal wing: Justices Stephen G. Breyer, Sonia Sotomayor and --- len: 75
7| Elena Kagan. Neither side gave reasons. The result suggested that Judge --- len: 72
8| Amy Coney Barrett, whom President Trump nominated to replace Justice Ruth --- len: 74
9| Bader Ginsburg after her death last month, could play a decisive role in --- len: 73
10| election disputes. Judge Barrett is expected to be confirmed next week. --- len: 72
11| The Pennsylvania Supreme Court ruled that the three-day extension was --- len: 70
12| required by the coronavirus pandemic and delays in mail service, and it --- len: 72
13| ordered the counting of ballots clearly mailed on or before Election Day --- len: 73
14| and of those with missing or illegible postmarks "unless a preponderance --- len: 75
15| of the evidence demonstrates that it was mailed after Election Day." The --- len: 75
16| ruling is a major victory for Democrats in the state who have been pushing --- len: 75
17| to expand access to voting in the pandemic, and for a party that has been --- len: 74
18| requesting absentee ballots in far greater numbers than Republicans. As of --- len: 75
19| Friday, Democrats in Pennsylvania had requested 1,755,940 ballots, and --- len: 71
20| Republicans had requested 672,381, according to the Pennsylvania secretary --- len: 75
-----

(n)ext page, (p)revious page, (i)nsert word, (d)elele word, (r)eplace words, (s)earch word, (t)erminate and save.
-----

[Console] i(1,10,hello) success
-----

Input: |
```


- d(2,10)

```
(Line 1~20 / 84)
1| The Supreme Court's action was the result of a deadlock. hello It takes --- len: 74
2| five votes to grant a stay, and the Republicans had asked the court to --- len: 71
3| intervene could muster only four: Justices Clarence Thomas, Samuel A. --- len: 70
4| Alito Jr., Neil M. Gorsuch and Brett M. Kavanaugh. On the other side of --- len: 72
5| the divide were Chief Justice John G. Roberts Jr. and the court's --- len: 68
6| three-member liberal wing: Justices Stephen G. Breyer, Sonia Sotomayor and --- len: 75
7| Elena Kagan. Neither side gave reasons. The result suggested that Judge --- len: 72
8| Amy Coney Barrett, whom President Trump nominated to replace Justice Ruth --- len: 74
9| Bader Ginsburg after her death last month, could play a decisive role in --- len: 73
10| election disputes. Judge Barrett is expected to be confirmed next week. --- len: 72
11| The Pennsylvania Supreme Court ruled that the three-day extension was --- len: 70
12| required by the coronavirus pandemic and delays in mail service, and it --- len: 72
13| ordered the counting of ballots clearly mailed on or before Election Day --- len: 73
14| and of those with missing or illegible postmarks "unless a preponderance --- len: 75
15| of the evidence demonstrates that it was mailed after Election Day." The --- len: 75
16| ruling is a major victory for Democrats in the state who have been pushing --- len: 75
17| to expand access to voting in the pandemic, and for a party that has been --- len: 74
18| requesting absentee ballots in far greater numbers than Republicans. As of --- len: 75
19| Friday, Democrats in Pennsylvania had requested 1,755,940 ballots, and --- len: 71
20| Republicans had requested 672,381, according to the Pennsylvania secretary --- len: 75
-----
(n)ext page, (p)revious page, (i)nsert word, (d)etele word, (r)eplace words, (s)earch word, (t)erminate and save.
-----
[Console] d(2,10) success
-----
Input: |
```

- s(court)

```
(Line 2~21 / 84)
2| five votes to grant a stay, and the Republicans had asked the court to --- len: 71
3| intervene could muster only four: Justices Clarence Thomas, Samuel A. --- len: 70
4| Alito Jr., Neil M. Gorsuch and Brett M. Kavanaugh. On the other side of --- len: 72
5| the divide were Chief Justice John G. Roberts Jr. and the court's --- len: 68
6| three-member liberal wing: Justices Stephen G. Breyer, Sonia Sotomayor and --- len: 75
7| Elena Kagan. Neither side gave reasons. The result suggested that Judge --- len: 72
8| Amy Coney Barrett, whom President Trump nominated to replace Justice Ruth --- len: 74
9| Bader Ginsburg after her death last month, could play a decisive role in --- len: 73
10| election disputes. Judge Barrett is expected to be confirmed next week. --- len: 72
11| The Pennsylvania Supreme Court ruled that the three-day extension was --- len: 70
12| required by the coronavirus pandemic and delays in mail service, and it --- len: 72
13| ordered the counting of ballots clearly mailed on or before Election Day --- len: 73
14| and of those with missing or illegible postmarks "unless a preponderance --- len: 75
15| of the evidence demonstrates that it was mailed after Election Day." The --- len: 75
16| ruling is a major victory for Democrats in the state who have been pushing --- len: 75
17| to expand access to voting in the pandemic, and for a party that has been --- len: 74
18| requesting absentee ballots in far greater numbers than Republicans. As of --- len: 75
19| Friday, Democrats in Pennsylvania had requested 1,755,940 ballots, and --- len: 71
20| Republicans had requested 672,381, according to the Pennsylvania secretary --- len: 75
21| of state's office. Of course, it could result in further delays in --- len: 69
-----
(n)ext page, (p)revious page, (i)nsert word, (d)etele word, (r)eplace words, (s)earch word, (t)erminate and save.
-----
[Console] s(court) success
-----
Input: |
```


- r(Thomas, bye)

```
(Line 2~21 / 84)
2| five votes to grant a stay, and the Republicans had asked the court to --- len: 71
3| intervene could muster only four: Justices Clarence bye, Samuel A. Alito --- len: 73
4| Jr., Neil M. Gorsuch and Brett M. Kavanaugh. On the other side of the --- len: 70
5| divide were Chief Justice John G. Roberts Jr. and the court's --- len: 64
6| three-member liberal wing: Justices Stephen G. Breyer, Sonia Sotomayor and --- len: 75
7| Elena Kagan. Neither side gave reasons. The result suggested that Judge --- len: 72
8| Amy Coney Barrett, whom President Trump nominated to replace Justice Ruth --- len: 74
9| Bader Ginsburg after her death last month, could play a decisive role in --- len: 73
10| election disputes. Judge Barrett is expected to be confirmed next week. --- len: 72
11| The Pennsylvania Supreme Court ruled that the three-day extension was --- len: 70
12| required by the coronavirus pandemic and delays in mail service, and it --- len: 72
13| ordered the counting of ballots clearly mailed on or before Election Day --- len: 73
14| and of those with missing or illegible postmarks "unless a preponderance --- len: 75
15| of the evidence demonstrates that it was mailed after Election Day." The --- len: 75
16| ruling is a major victory for Democrats in the state who have been pushing --- len: 75
17| to expand access to voting in the pandemic, and for a party that has been --- len: 74
18| requesting absentee ballots in far greater numbers than Republicans. As of --- len: 75
19| Friday, Democrats in Pennsylvania had requested 1,755,940 ballots, and --- len: 71
20| Republicans had requested 672,381, according to the Pennsylvania secretary --- len: 75
21| of state's office. Of course, it could result in further delays in --- len: 69
-----
(n)ext page, (p)revious page, (i)nsert word, (d)elele word, (r)eplace words, (s)earch word, (t)erminate and save.
-----
[Console] r(Thomas,bye) success
-----
Input: |
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- n → n → n → n → p

```
(Line 22~41 / 84)
22| reporting results. Pennsylvania is already expected to be one of the last --- len: 74
23| (Line 42~61 / 84)
24| 42| conducting elections. In April, for instance, the justices, dividing 5 to --- len: 74
25| 43| 4, overturned a federal judge's order that had lengthened a deadline for --- len: 75
26| 44| absen (Line 62~81 / 84)
27| 45| this 62| questions, as the Supreme Court generally defers to them in cases --- len: 66
28| 46| ballo 63| concerning interpretations of state law and the Constitution empowers --- len: 70
29| 47| Three 64| sta (Line 65~84 / 84)
30| 48| you v 65| ele 65| elections. In a second brief, the Republican Party of Pennsylvania argued --- len: 74
31| 49| in yo 66| tha 66| that "the Constitution reserves a special role for state legislatures in --- len: 75
32| 50| You S 67| fed 67| fed
33| 51| Elect 68| bri (Line 45~64 / 84)
34| 52| them 69| cul 45| this year, making it a little trickier to figure out how to cast your --- len: 70
35| 53| list 70| Geo 46| ballot. Here's a state-by-state guide to make sure your vote is counted. --- len: 75
36| 54| False 71| est 47| Three Main Ways to Vote: We may be in the midst of a pandemic, but whether --- len: 75
37| 55| mail, 72| mai 48| you vote in person on Election Day, a few weeks early, or prefer to mail --- len: 73
38| 56| ballo 73| Sup 49| in your ballot this year, it can still be a straightforward process. Do --- len: 72
39| 57| not j 74| 'ma 50| You Still Have Time?: Voters in 35 states can request ballots so close to --- len: 74
40| 58| addit 75| ele 51| Election Day that it may not be feasible for their ballots to be mailed to --- len: 75
41| 59| the n 76| Dem 52| them and sent back to election officials in time to be counted. Here's a --- len: 75
---- 60| said. 77| and 53| list of states where it's risky to procrastinate. Fact-Checking the --- len: 70
(n)e 61| polit 78| the 54| Falsehoods: Voters are facing a deluge of misinformation about voting by --- len: 73
---- 79| wit 79| the 55| mail, some prompted by the president. Here's the truth about absentee --- len: 72
[Con (n)ext pa 80| cas 56| ballots. "Extending the date by which ballots may be cast by voters - --- len: 74
---- 81| Ten 57| not just received by the municipal clerks but cast by voters - for an --- len: 72
Inpu [Console] ---- 82| to 58| additional six days after the scheduled Election Day fundamentally alters --- len: 74
----- (n)ext 83| mai 59| the nature of the election," the unsigned opinion in the Wisconsin case --- len: 74
Input: | ----- 84| res: 60| said. Sign up to receive our On Politics newsletter, a daily guide to the --- len: 74
[Conso 61| political news cycle. Rulings from state courts present more difficult --- len: 71
----- 62| questions, as the Supreme Court generally defers to them in cases --- len: 66
Input: | ----- 63| concerning interpretations of state law and the Constitution empowers --- len: 70
----- 64| state legislatures to set the times, places and manner of congressional --- len: 72
-----
Input: | (n)ext page, (p)revious page, (i)nsert word, (d)elele word, (r)eplace words, (s)earch word, (t)erminate and save.
-----
[Console] p success
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Input: |
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- 초기 시작 → i(1,10,hello) → r(Samuel,Seungmin) → t → 텍스트 비교

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(Line 1~20 / 84)
1| The Supreme Court's action was the result of a deadlock. hello It takes --- len: 74
2| five votes to grant a stay, and the Republicans who had asked the court to --- len: 75
3| intervene could muster only four: Justices Clarence Thomas, Seungmin A. --- len: 72
4| Alito Jr., Neil M. Gorsuch and Brett M. Kavanaugh. On the other side of --- len: 72
5| the divide were Chief Justice John G. Roberts Jr. and the court's --- len: 68
6| three-member liberal wing: Justices Stephen G. Breyer, Sonia Sotomayor and --- len: 75
7| Elena Kagan. Neither side gave reasons. The result suggested that Judge --- len: 72
8| Amy Coney Barrett, whom President Trump nominated to replace Justice Ruth --- len: 74
9| Bader Ginsburg after her death last month, could play a decisive role in --- len: 73
10| election disputes. Judge Barrett is expected to be confirmed next week. --- len: 72
11| The Pennsylvania Supreme Court ruled that the three-day extension was --- len: 70
12| required by the coronavirus pandemic and delays in mail service, and it --- len: 72
13| ordered the counting of ballots clearly mailed on or before Election Day --- len: 73
14| and of those with missing or illegible postmarks "unless a preponderance --- len: 75
15| of the evidence demonstrates that it was mailed after Election Day." The --- len: 75
16| ruling is a major victory for Democrats in the state who have been pushing --- len: 75
17| to expand access to voting in the pandemic, and for a party that has been --- len: 74
18| requesting absentee ballots in far greater numbers than Republicans. As of --- len: 75
19| Friday, Democrats in Pennsylvania had requested 1,755,940 ballots, and --- len: 71
20| Republicans had requested 672,381, according to the Pennsylvania secretary --- len: 75
-----
(n)ext page, (p)revious page, (i)nsert word, (d)elete word, (r)eplace words, (s)earch word, (t)erminate and save.
-----
[Console] r(Samuel,Seungmin) success
-----
Input: t
Terminated!
seungminjeon@as123456-HPE-390kr:~/Desktop/study/CSE_00D/Term/build$
```

(좌) 원본

(후) 저장된 Text

<pre>1 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 that 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 that 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</pre>	<pre>1 The Supreme Court's action was the result of a deadlock. hello 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, Seungmin 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 that 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 that 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</pre>
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4. Github 링크

https://github.com/zzz845zz/CSE_OOD/tree/master/Term