Flags-Template

name: csl

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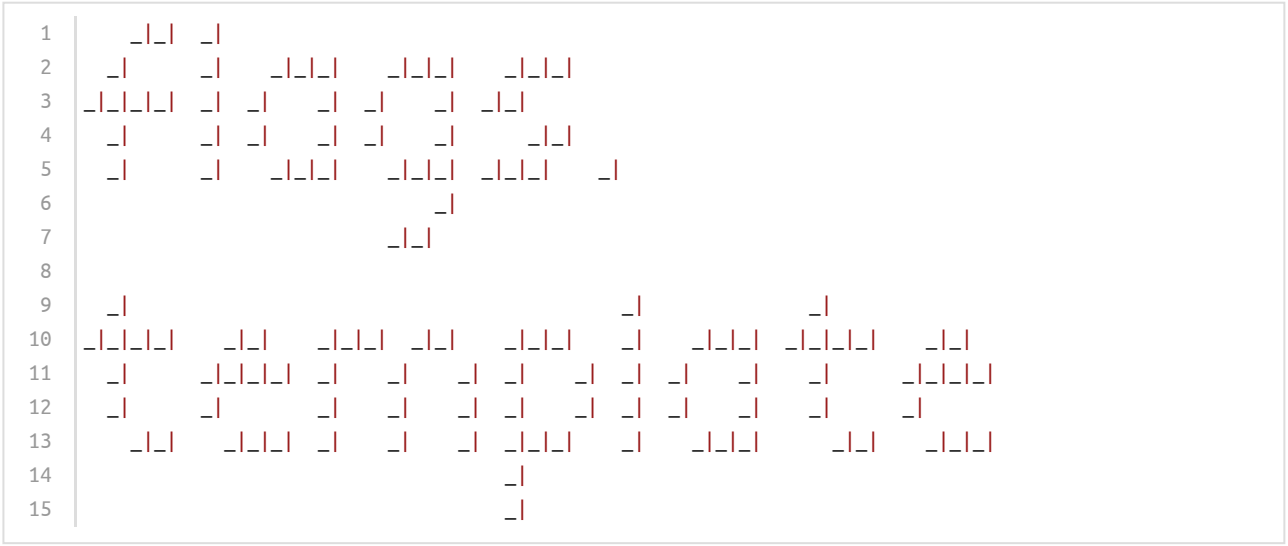


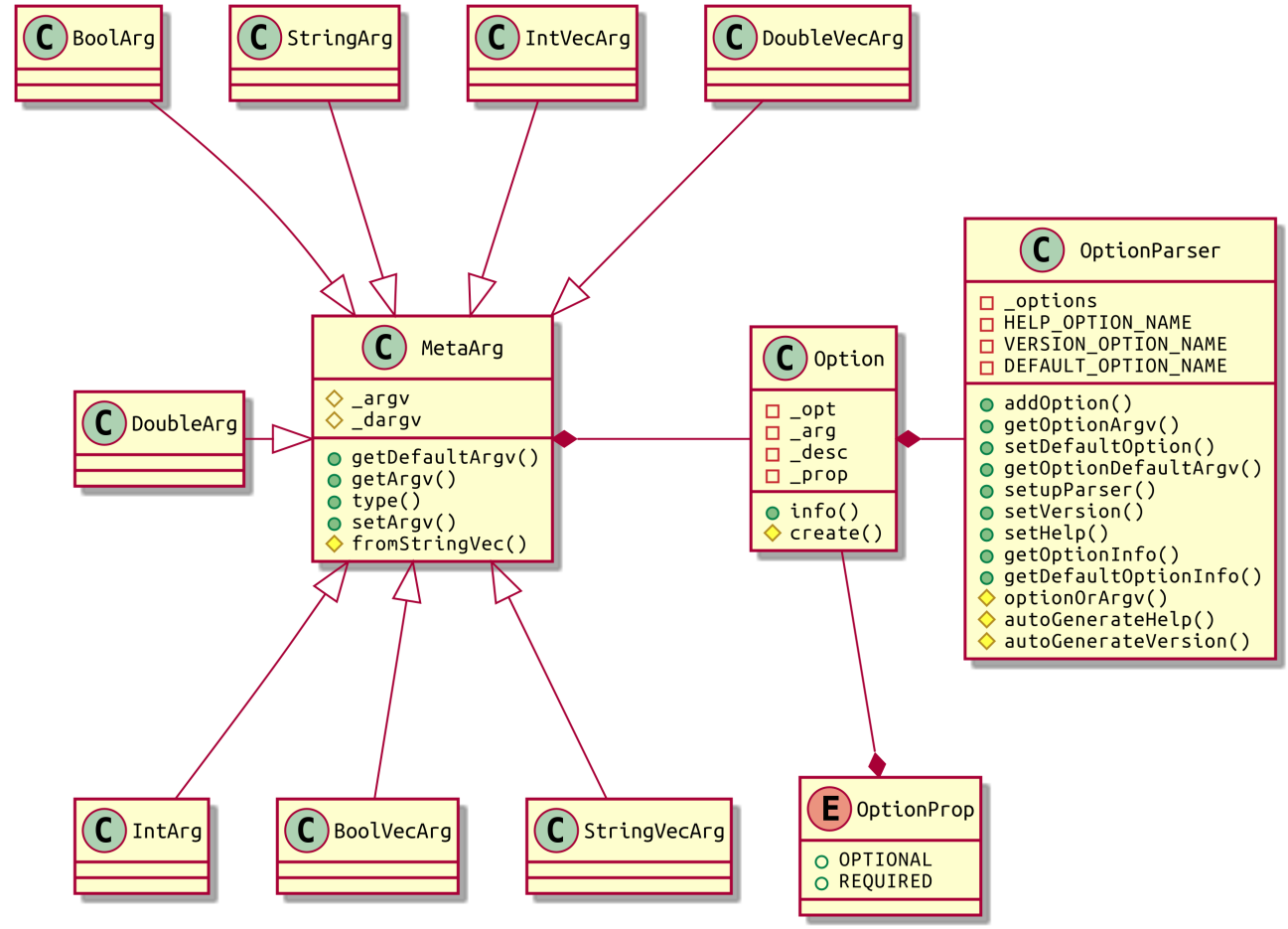
1. OverView

this is a simple 'program-command-line-parameter-parsing' library using cpp-template.

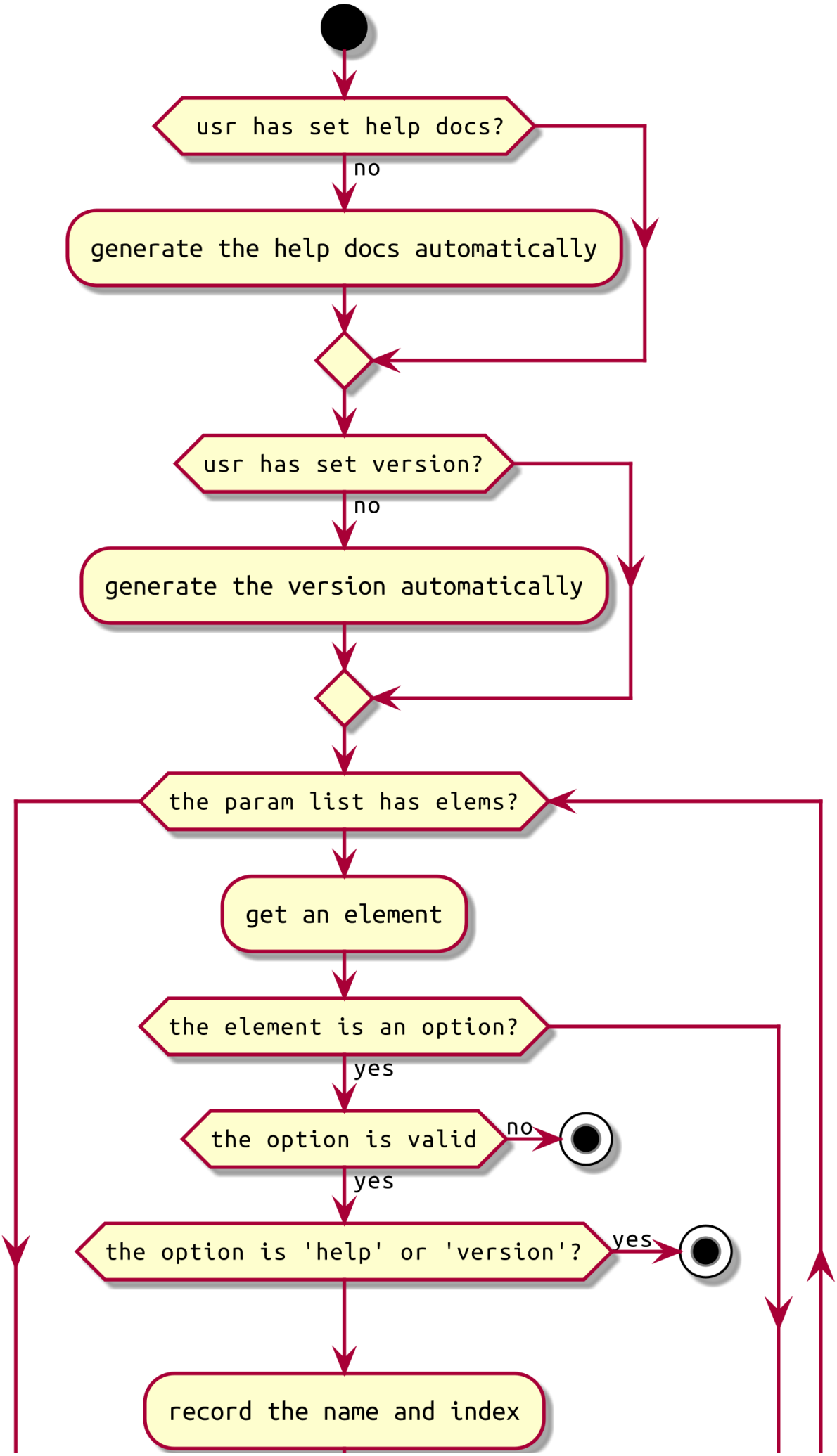
the main functions:

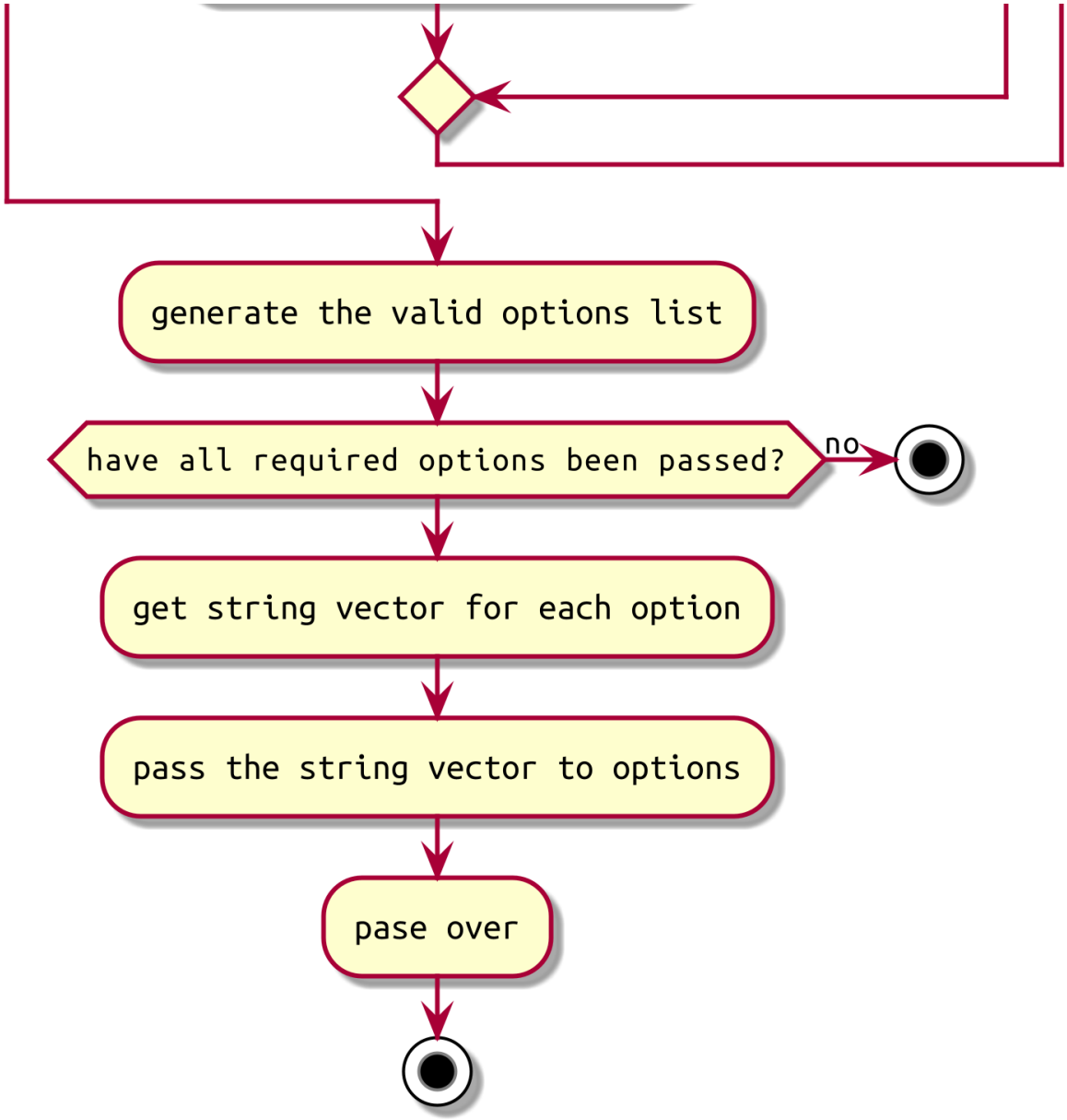
- Add command line parameters to the specified program and set the relevant properties of the command line parameters;
- Parse the passed in parameters based on the set command line parameters;
- During parsing, identify and check the command line parameters (such as wrong type, wrong option name, inconsistent selectability);

2. Structure


BoolArg
StringArg
IntVecArg
DoubleVecArg
MetaArg
_argv
_dargv
getDefaultArgv()
getArgv()
type()
setArgv()
fromStringVec()
DoubleArg
Option
_opt
_arg
_desc
_prop
info()
create()
OptionParser
_options
HELP_OPTION_NAME
VERSION_OPTION_NAME
DEFAULT_OPTION_NAME
addOption()
getOptionArgv()
setDefaultOption()
getOptionDefaultArgv()
setupParser()
setVersion()
setHelp()
getOptionInfo()
getDefaultOptionInfo()
optionOrArgv()
autoGenerateHelp()
autoGenerateVersion()
IntArg
BoolVecArg
StringVecArg
OptionProp
OPTIONAL
REQUIRED

the steps


usr has set help docs?
no
generate the help docs automatically
usr has set version?
no
generate the version automatically
the param list has elems?
get an element
the element is an option?
yes
the option is valid
no
yes
the option is 'help' or 'version'?
yes
record the name and index



3. Usage

Example for Source Code

```cpp
#include "flags.hpp"

using namespace ns_flags;

int main(int argc, char const *argv[]) {
  /**
   * @brief try-catch is not necessary but it is strongly recommended,
   * because you can get a lot of advice when there are errors in your code
   */
  try {
    OptionParser parser;
    /**
     * @brief define some kinds of arguements
     * [int, std::string, bool, double]
```

```
     * std::vector<[int, std::string, bool, double]>
     */
    parser.addOption<IntArg>("id", 0, "the id of current thread");
    parser.addOption<StringArg>("usr", "null", "the name of usr");
    parser.addOption<BoolArg>("sex", true,
                              "the sex of usr [male: true, female: false]");
    parser.addOption<DoubleArg>("height", 1.7, "the height of usr", OptionProp::REQUIRED);
    parser.addOption<IntVecArg>("ids", {1, 2, 3}, "the ids of threads");
    parser.addOption<StringVecArg>("lans", {"cpp", "python"},
                                   "the used langusges of usr");
    parser.addOption<BoolVecArg>("choice", {true, false}, "the choice of usr");
    parser.addOption<DoubleVecArg>("scores", {2.3, 4.5}, "the score of usr");
    /**
     * @brief set version and help docs
     * @attention if you do not set the help docs, then the help docs
     * will generate automatically
     */
    parser.setVersion("2.0.0");
    // parser.set_help("");

    parser.setDefaultOption<StringVecArg>({""}, "the default option", OptionProp::REQUIRED);
    /**
     * @brief finally, you can set up the parser and then use these arguements
     */
    parser.setupParser(argc, argv);

    /**
     * @brief print the info of arguements
     */
    std::cout << parser << std::endl;
    std::cout << parser.getDefaultOptionInfo<StringVecArg>() << std::endl;

    /**
     * @brief use the arguements
     */
    auto id = parser.getOptionArgv<IntArg>("id");
    std::cout << "the 'id' I get is: " << id << std::endl;
  } catch (const std::exception &e) {
    std::cerr << e.what() << '\n';
  }
  return 0;
}
```

Output

if you want to over view the example log file for command lines and outputs, please click the log file.

if run command line:

```
./flags hello "I'm" flags!
```

will output:

```
[ error from 'libflags'-'setupParser' ] the option named '--height' is 'OptionProp::REQUIRED', but you didn't use it
```

if run command line:

```
/flags hello "I'm" flags!  --height 98.8 --sex true --usr csl --id 12 --choice true false true --ids 12 34 123 --scores 12.3 45.6 78.9 --lans cpp java python html
```

will output:

```
OptionParser Info: {
  {'opt': def-opt, 'type': StringVecArg, 'desc': the default option, 'prop': Required};
  {'opt': choice, 'type': BoolVecArg, 'desc': the choice of usr, 'prop': Optional};
  {'opt': ids, 'type': IntVecArg, 'desc': the ids of threads, 'prop': Optional};
  {'opt': scores, 'type': DoubleVecArg, 'desc': the score of usr, 'prop': Optional};
  {'opt': lans, 'type': StringVecArg, 'desc': the used langusges of usr, 'prop': Optional};
  {'opt': height, 'type': DoubleArg, 'desc': the height of usr, 'prop': Required};
  {'opt': sex, 'type': BoolArg, 'desc': the sex of usr [male: true, female: false], 'prop': Optional};
  {'opt': usr, 'type': StringArg, 'desc': the name of usr, 'prop': Optional};
  {'opt': version, 'type': StringArg, 'desc': display the version of this program, 'prop': Optional};
  {'opt': id, 'type': IntArg, 'desc': the id of current thread, 'prop': Optional};
  {'opt': help, 'type': StringArg, 'desc': display the help docs, 'prop': Optional};
}
{'opt': def-opt, 'type': StringVecArg, 'desc': the default option, 'prop': Required, 'default': [], 'value': [hello, I'm, flags!]}
the 'id' I get is: 12
```

if run command line:

```
./flags --help
```

will output:

```
Usage: ./flags [def-opt target(s)] [--option target(s)] ...

    Options        Property       Type           Describes
-------------------------------------------------------------
  --def-opt        Required       StringVecArg   the default option

  --choice         Optional       BoolVecArg     the choice of usr
  --ids            Optional       IntVecArg      the ids of threads
  --scores         Optional       DoubleVecArg   the score of usr
  --lans           Optional       StringVecArg   the used langusges of usr
  --height         Required       DoubleArg      the height of usr
  --sex            Optional       BoolArg        the sex of usr [male: true, female: false]
  --usr            Optional       StringArg      the name of usr
  --id             Optional       IntArg         the id of current thread

  --help           Optional       StringArg      display the help docs
  --version        Optional       StringArg      display the version of this program

help docs for program "./flags"
```

if run command line:

```
./flags --version
```

will output:

```
./flags version: 2.0.0
```

if run command line:

```
./flags --nema 12
```

will output:

```
[ error from 'libflags'-'setupParser' ] the option named '--nema' is invalid
```

4. Apis

Arguement Types

Here are the types you can use in the 'arguement-parser':

```
class IntArg : public MetaArg {
    ...
};

class DoubleArg : public MetaArg {
    ...
};

class BoolArg : public MetaArg {
    ...
};

class StringArg : public MetaArg {
    ...
};

class IntVecArg : public MetaArg {
    ...
};

class DoubleVecArg : public MetaArg {
    ...
};

class BoolVecArg : public MetaArg {
    ...
};

class StringVecArg : public MetaArg {
    ...
};
```

Option Property

```
enum class OptionProp {
  /**
   * @brief options
   */
  OPTIONAL,
  REQUIRED
};
```

Option

```

  class Option {
    template <typename ArgType>
    std::string info() {
        ...
    }

    /**
     * @brief create an option
     *
     * @tparam ArgType the arguement class type. eg: IntArg, DoubleArg
     * @param optName the option's name
     * @param defaultArgv the default arguement value
     * @param desc the describe of the arguement
     * @param prop the prop of option
     * @return Option
     */
    template <typename ArgType>
    static Option create(const std::string &optName, const typename ArgType::value_type &defaultArgv,
                         const std::string &desc, OptionProp prop = OptionProp::OPTIONAL) {
        ...
    }

  private:
    std::string _opt;
    std::shared_ptr<MetaArg> _arg;
    std::string _desc;
    OptionProp _prop;
  };
```

OptionParser

```
  class OptionParser {
  public:
    OptionParser() {
        ...
    }
```

```
6
7   public:
8     /**
9      * @brief add an option to the option parser
10     *
11     * @tparam ArgType the arguement class type. eg: IntArg, DoubleArg
12     * @param optName the option's name
13     * @param defaultArgv the default arguement value
14     * @param desc the describe of the arguement
15     * @param prop the prop of option
16     * @return OptionParser&
17     */
18    template <typename ArgType>
19    OptionParser &addOption(const std::string &optName,
20                            const typename ArgType::value_type &defaultArgv,
21                            const std::string &desc,
22                            OptionProp prop = OptionProp::OPTIONAL) {
23        ...
24    }
25
26    /**
27     * @brief add an option to the option parser
28     *
29     * @tparam ArgType the arguement class type. eg: IntArg, DoubleArg
30     * @param defaultArgv the default arguement value
31     * @param desc the describe of the arguement
32     * @param prop the prop of option
33     * @return OptionParser&
34     */
35    template <typename ArgType>
36    OptionParser &setDefaultOption(const typename ArgType::value_type &defaultArgv,
37                                   const std::string &desc = "the default option",
38                                   OptionProp prop = OptionProp::OPTIONAL) {
39        ...
40    }
41
42    /**
43     * @brief get the default arguement value of the option
44     *
45     * @tparam ArgType the arguement class type. eg: IntArg, DoubleArg
46     * @param optName the option's name
47     * @return ArgType::value_type
48     */
49    template <typename ArgType>
50    typename ArgType::value_type getOptionDefaultArgv(const std::string &optionName) {
51        ...
52    }
53
54    /**
55     * @brief get the default arguement value of the option
56     *
57     * @tparam ArgType the arguement class type. eg: IntArg, DoubleArg
58     * @param optName the option's name
59     * @return ArgType::value_type
60     */
61    template <typename ArgType>
62    typename ArgType::value_type getOptionArgv(const std::string &optionName) {
63        ...
64    }
65
66    /**
```

```
     * @brief get the default arguement value of the option
     *
     * @tparam ArgType the arguement class type. eg: IntArg, DoubleArg
     * @param optName the option's name
     * @return ArgType::value_type
     */
    template <typename ArgType>
    typename ArgType::value_type getDefaultOptionArgv() {
        ...
    }

    /**
     * @brief set up the parser
     *
     * @param argc the count of the arguement
     * @param argv the value of the arguement
     * @return OptionParser&
     */
    OptionParser &setupParser(int argc, char const *argv[]) {
        ...
    }

    /**
     * @brief set the version string
     *
     * @param version the string
     * @return OptionParser&
     */
    OptionParser &setVersion(const std::string &version) {
        ...
    }

    /**
     * @brief set the help string
     *
     * @param help the string
     * @return OptionParser&
     */
    OptionParser &setHelp(const std::string &help) {
        ...
    }

    /**
     * @brief get the option's info
     *
     * @tparam ArgType the type of arguement
     * @param optionName the name of option
     * @return std::string
     */
    template <typename ArgType>
    std::string getOptionInfo(const std::string &optionName) {
        ...
    }

    /**
     * @brief get the default option's Info
     *
     * @tparam ArgType the type of arguement
     * @return std::string
     */
    template <typename ArgType>
```

```
128     std::string getDefaultOptionInfo() {
129         ...
130     }
131 
132   private:
133     std::unordered_map<std::string, Option> _options;
134 
135     const std::string HELP_OPTION_NAME = "help";
136     const std::string VERSION_OPTION_NAME = "version";
137     const std::string DEFAULT_OPTION_NAME = "def-opt";
138   };
```