

```
1: // Chaitanya and Shivam
2:
3: #include <iostream>
4: #include <fstream>
5: #include <string>
6: #include <cmath>
7:
8: using namespace std;
9:
10: int main() {
11:
12:     ifstream fin("command_data.txt");
13:     if (!fin)
14:     {
15:         cout << "Error! could not open the file: command_data.txt";
16:         return 1;
17:     }
18:
19:
20:     int totalCommands = 0;
21:     int interestingCount = 0;
22:     int unauthorizedCount = 0;
23:     int gppCount = 0;
24:     int makeCount = 0;
25:
26:
27:     int cmdID;
28:     string username;
29:     long timeStamp;
30:     string commandType;
31:     int N;
32:
33:
34:     while (fin >> cmdID >> username >> timeStamp >> commandType >> N)
35:     {
36:         totalCommands++;
37:
38:         bool hasStd = false;
39:         bool correctOutput = true;
40:
41:         //Reading N components:
42:         for(int i = 0; i < N; i++)
43:     {
```

```
44:         string component;
45:
46:         fin >> component;
47:
48:         if (commandType == "g++")
49:         {
50:             if (component == "-std=c++17")
51:             {
52:                 hasStd = true;
53:             }
54:
55:             if (component == "-o")
56:             {
57:                 string nextComp;
58:
59:                 if (i + 1 < N)
60:                 {
61:                     fin >> nextComp;
62:                     i++;
63:
64:                     if (nextComp != "a.out")
65:                     {
66:                         correctOutput = false;
67:                     }
68:
69:                 }
70:
71:                 else
72:                 {
73:                     correctOutput = false;
74:                 }
75:             }
76:         }
77:
78:
79:         //Interesting Commands:
80:         if (commandType == "make" || commandType == "g++" ||
81:             commandType == "valgrind" || commandType == "tar" || commandType ==
82:             "./a.out")
83:         {
84:             interestingCount++;
85:         }
```

```
85:         //Unauthorized Commands:  
86:         if (commandType == "sudo")  
87:         {  
88:             unauthorizedCount++;  
89:         }  
90:  
91:         //Compilation Commands:  
92:         if (commandType == "make")  
93:         {  
94:             makeCount++;  
95:         }  
96:  
97:         if (commandType == "g++")  
98:         {  
99:             gppCount++;  
100:  
101:             bool invalidStd = !hasStd;  
102:             bool invalidOut = !correctOutput;  
103:  
104:             if (invalidStd || invalidOut)  
105:             {  
106:                 cout << "Command " << cmdID << " is invalid: ";  
107:  
108:                 if (invalidStd && invalidOut)  
109:                 {  
110:                     cout << "both errors" << endl;  
111:                 }  
112:  
113:                 else if (invalidStd)  
114:                 {  
115:                     cout << "wrong or missing standard" << endl;  
116:                 }  
117:  
118:                 else  
119:                 {  
120:                     cout << "wrong output file" << endl;  
121:                 }  
122:             }  
123:         }  
124:     }  
125:  
126:     fin.close();  
127:
```

```
128:     //Calculations:  
129:     double unauthorizedPer = (100.0 * unauthorizedCount) /  
totalCommands;  
130:  
131:     double gppPer = (100.0 * gppCount) / (gppCount + makeCount);  
132:  
133:     //Output:  
134:     cout << endl << "Total number of interesting commands: " <<  
interestingCount << endl;  
135:     cout << "Percentage of unauthorized commands: " <<  
unauthorizedPer << "%" << endl;  
136:     cout << "Percentage of g++ compilation commands: " << gppPer <<  
"%" << endl;  
137:  
138:     return 0;  
139: }  
140:  
141: /*  
142:  
143: OUTPUT:  
144:  
145: Command 63438 is invalid: wrong or missing standard  
146: Command 63445 is invalid: wrong or missing standard  
147: Command 63447 is invalid: wrong or missing standard  
148: Command 63449 is invalid: wrong or missing standard  
149: Command 63451 is invalid: wrong or missing standard  
150: Command 63453 is invalid: wrong or missing standard  
151: Command 63455 is invalid: wrong or missing standard  
152: Command 63457 is invalid: wrong or missing standard  
153: Command 63459 is invalid: wrong or missing standard  
154: Command 63477 is invalid: wrong or missing standard  
155: Command 63865 is invalid: both errors  
156: Command 64232 is invalid: wrong output file  
157: Command 64233 is invalid: wrong output file  
158: Command 64246 is invalid: wrong output file  
159: Command 64261 is invalid: wrong output file  
160: Command 64263 is invalid: wrong output file  
161: Command 64265 is invalid: wrong output file  
162: Command 64267 is invalid: wrong output file  
163: Command 64298 is invalid: wrong output file  
164:  
165: Total number of interesting commands: 535  
166: Percentage of unauthorized commands: 0.9%
```

167: *Percentage of g++ compilation commands: 11.5556%*
168:
169: -----
170: *Process exited after 4.302 seconds with return value 0*
171: *Press any key to continue . . .*
172:
173: */
174: