Intro. to Secure Programming

Study Groups at NCYU

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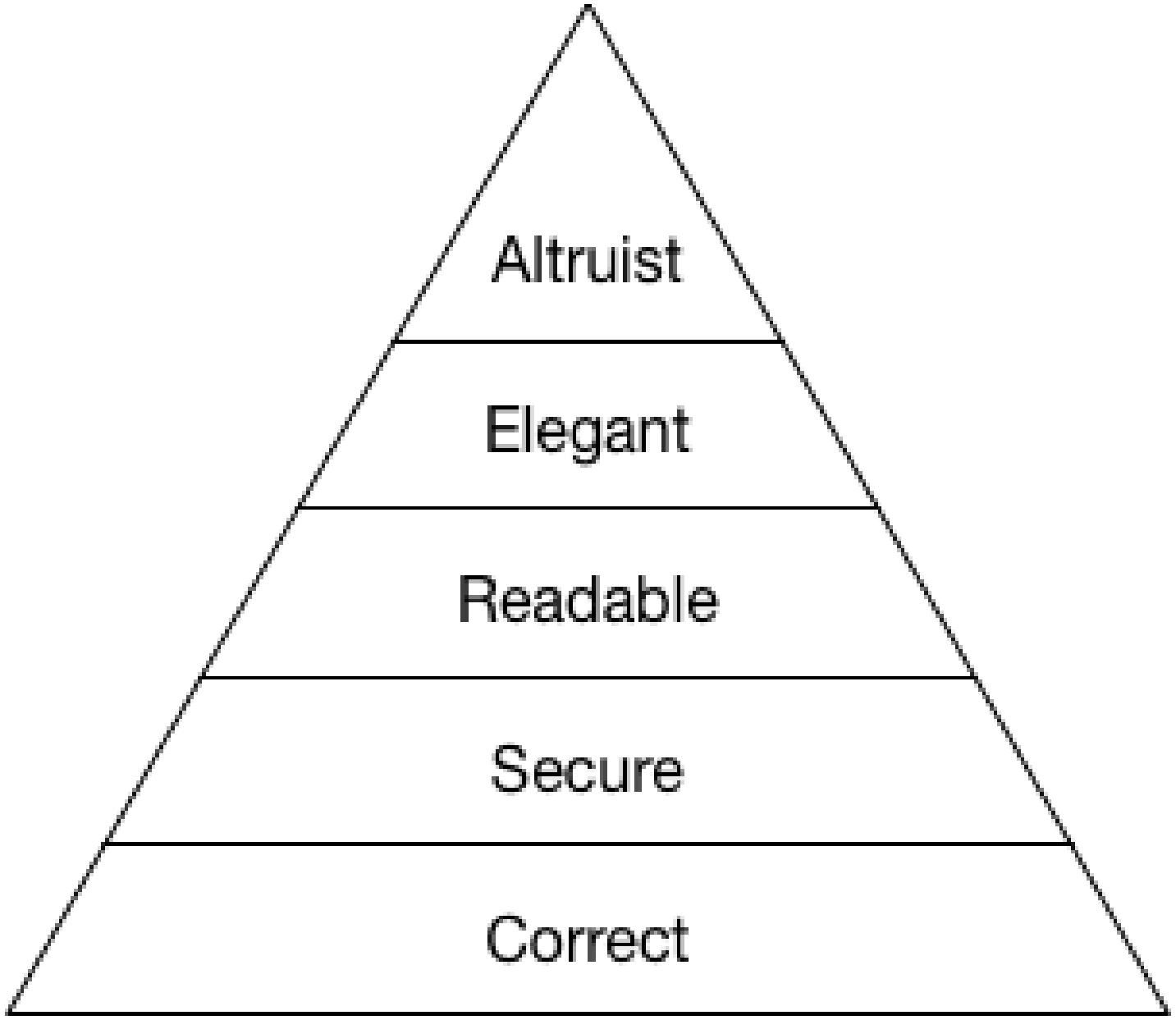
About me

- 楊志璿
- NSYSU Information security club founder
- Resume
- Linux, Modern C++

Outline

Background

Maslow's pyramid of code review



Maslow's pyramid of code review

- Correct：做到預期的行為了嗎？能夠處理各式邊際狀況嗎？即便其他人修改程式碼後，主體的行為仍符合預期嗎？
- Secure：面對各式輸入條件或攻擊，程式仍可正確運作嗎？
- Readable：程式碼易於理解和維護嗎？
- Elegant：程式碼夠「美」嗎？可以簡潔又清晰地解決問題嗎？
- Altruist：除了滿足現有的狀況，軟體在日後能夠重用嗎？甚至能夠抽離一部分元件，給其他專案使用嗎？

Programmer's qualities

Binary search

```
1  int wrong(int *arr, size_t len, int target)
2  {
3      int begin = 0, end = len;
4      while (begin <= end)
5      {
6          int mid = (begin + end) / 2;
7          if (arr[mid] == target)
8              return mid;
9          else if (arr[mid] < target)
10             end = mid;
11         else
12             begin = mid;
13     }
14     return -1;
15 }
```

Binary search

```
1  int correct(int *arr, size_t len, int target)
2  {
3      int begin = 0, end = len;
4      while (begin <= end)
5      {
6          int mid = (begin >> 1) + (end >> 1);
7          if (arr[mid] == target)
8              return mid;
9          else if (arr[mid] < target)
10             end = mid;
11         else
12             begin = mid;
13     }
14     return -1;
15 }
```

Binary search

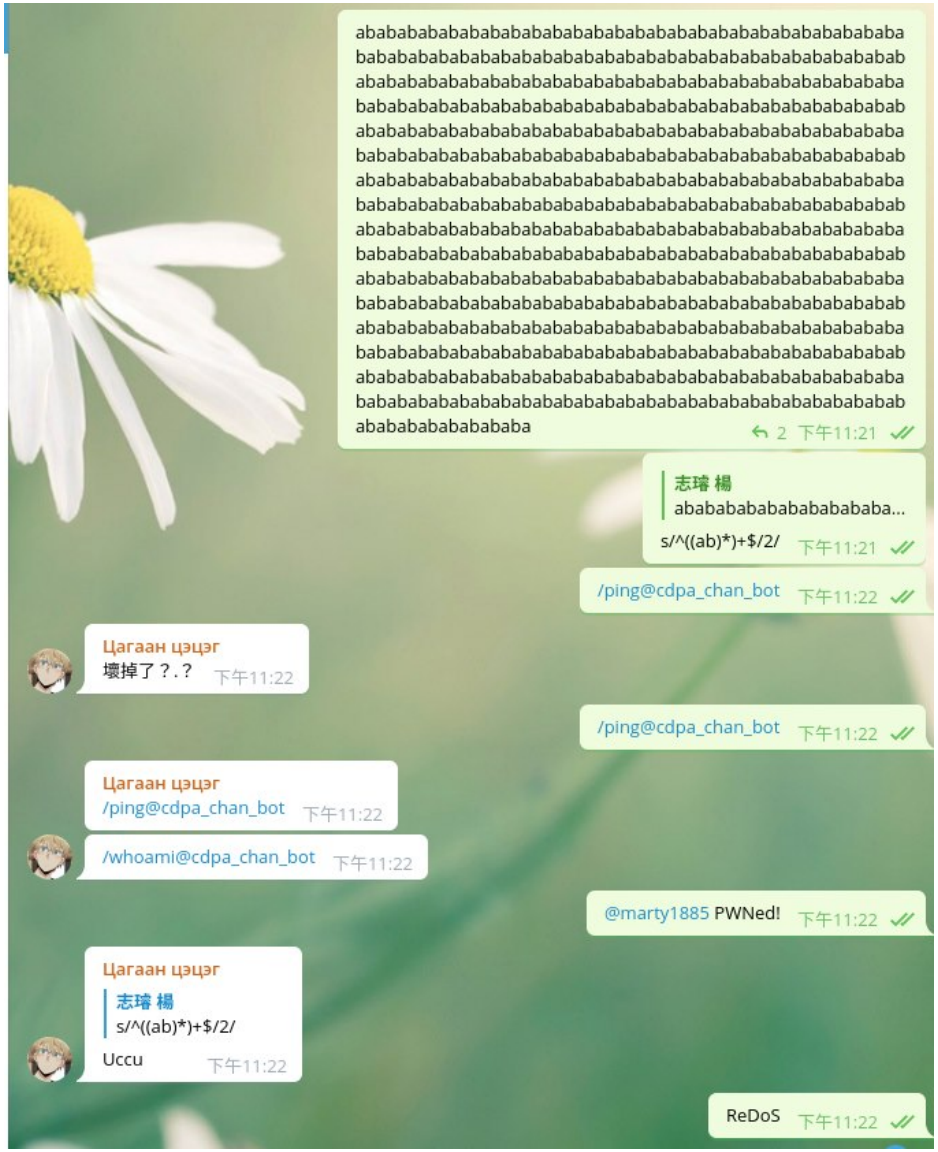
- 1946 idea
- 1960 mathematical analysis
- 1988 find bugs.

Donald Knuth

Although the basic idea of binary search is comparatively straightforward, the details can be surprisingly tricky.

ReDoS


Martin Chang owner
Martin Chang
https://www.reddit.co...
s/utm_.*//
下午9:09
CDPA Chan
Martin Chang覺得Martin Chang的意思其實是：
https://www.reddit.com/r/WireGuard/comments/fodgpi/adding_peer_without_having_to_restart_service/?
reddit
Adding peer without having to restart service?
I cannot figure out how to add a peer without using: wg-quick down wg0 && wg-quick up wg0 After I add my peer with wg set peer PEER_KEY...
1 下午9:09
Martin Chang owner
Good
4 下午9:10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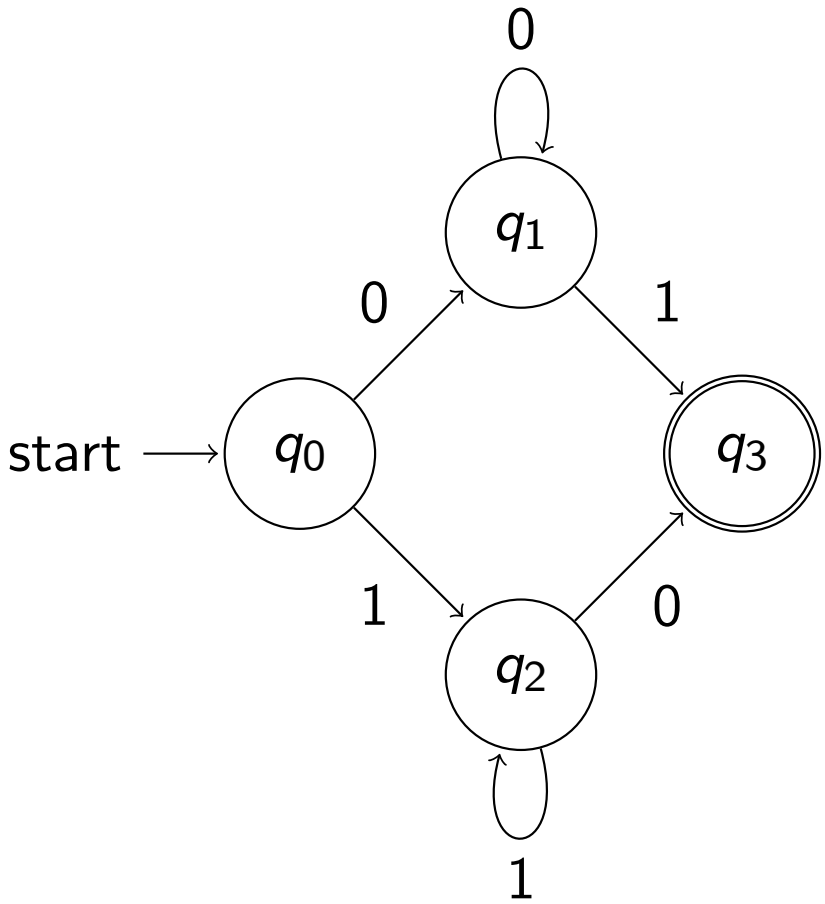
abababababababa
2 下午11:21
志琦 楊
abababababababababa...
s/^((ab)*)+$/2/
下午11:21
/ping@cdpa_chan_bot 下午11:22
Цагаан цэцэг
壞掉了？.？
下午11:22
/ping@cdpa_chan_bot 下午11:22
Цагаан цэцэг
/ping@cdpa_chan_bot 下午11:22
/whoami@cdpa_chan_bot 下午11:22
@marty1885 PWNed! 下午11:22
Цагаан цэцэг
志琦 楊
s/^((ab)*)+$/2/
Uccu
下午11:22
ReDoS 下午11:22

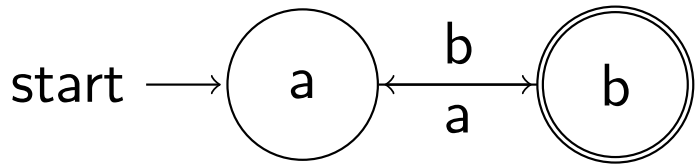
Regex

- Regular expression
- Finite state machine



Halting problem

^ ((ab)*)+$



Input

abababababababababababa

Halting problem

The engine will first try (abababababababababababab) but that fails because of that extra a. This causes catastrophic bracktracking, because our pattern (ab)*, in a show of good faith, will release one of it's captures (it will "backtrack") and let the outer pattern try again.

- (abababababababababababab) - Nope
- (abababababababababababab)(ab) - Nope
- (abababababababababababab)(abab) - Nope
- (abababababababababababab)(ab)(ab) - Nope
- (abababababababababababab)(ababab) - Nope
- (abababababababababababab)(abab)(ab) - Nope
- (abababababababababababab)(ab)(abab) - Nope
- (abababababababababababab)(ab)(ab)(ab) - Nope
- ...
- (ab)(ab)(ab)(ab)(ab)(ab)(ab)(ab)(ab)(ab)(ab)(ab) - Nope

Halting problem

NP-Hard

$$\sum_{i=0}^{N} dp[i] + dp[N-i] \sim \sum_{i=0}^{N} C_i^N = 2^N - 1$$