

Function

- Factorial
- Greatest Common Divisor
- Search in Array
- Fibonacci series
- Combinatorial numbers
- Towers of Hanoi

Solutions

- Breaks problems into smaller identical problems
- An alternative to iteration, which involves loops
- Repeatedly halves the data collection and searches the one half that could contain the item } in binary search

My Questions

Problems & Difficulties needing exploration

Fact about a recursive solution

- A recursive function calls itself
- Each recursive call solves an identical, but smaller, problem
- The solution to at least one smaller problem — the base case — is known
- one of the smaller problems must be the base case. reaching the base case enables the recursive calls to stop

My Opinions

Thoughts, inspirations, and suggestions

Recursive example

```
int fact(int n) {  
    if (n == 0) {  
        return 1;  
    }  
    else {  
        return n * fact(n - 1); ← recursive  
    }  
}
```

密碼
cipher key

守時：在對的時間，做對的事，來表明對別人的尊重。
《培基》

Operation Contracts

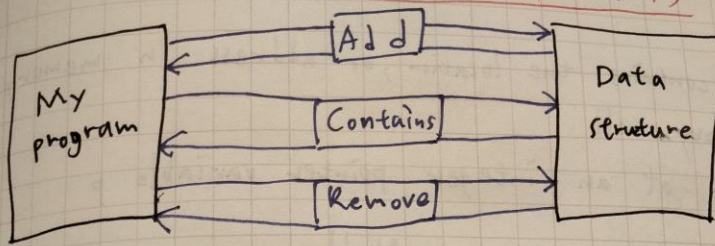
- A module's operation contract specifies its
 - Purpose
 - Assumptions
 - Input
 - Output
- Begin the contract during analysis, finish during design
- Use to document code, particularly in header files

Key Issues in Programming

- Modularity
- Style
- Modifiability
- Ease of Use
- Fail-safe programming
- Debugging
- Testing

My Problems & Difficulties needing exploration

Abstract Data Type (ADT)



ADT List Operations

- Create an empty list
- Destroy a list
- Determine whether a list is empty
- Determine the number of items in a list

My Opinions

Thoughts, inspirations, and suggestions

Operation Contract for ADT List

- createList()
- destroyList()
- isEmpty(): boolean { query }
- getLength(): integer { query }
- insert (位置, 物件)
- remove (位置)

密碼
cipher

藏在細縫裡，天使更是這樣。

My Notes

Important Concepts worth keeping

單元三 金連結串列

Today : / ,

Pointers

- A pointer contains the location, or address in memory, of a memory cell

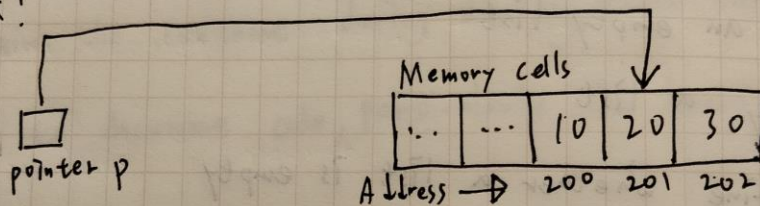
• Declaration of an integer pointer variable p

`int *p;`

⇒ Initially undefined, but **not** Null

⇒ Static allocation

圖示:



pointers 其它指令

- The address-of operator &

`p = &x;`

- The new operator

`p = new int;`

- Delete

`delete p;`

} The delete operator returns dynamically allocated memory to the system for reuse, and leaves the variable's contents undefined

Linked Lists

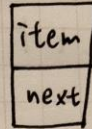
- A node in a linked list is usually a struct

```
struct Node {
```

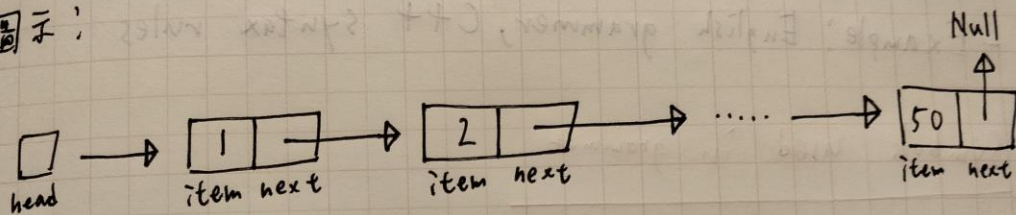
```
    int item
```

```
    Node *next;
```

```
};
```



圖示:



My Opinions

Thoughts, inspirations, and suggestions

Linked Lists 開始時應做

- 起一個 struct

- Node *p;

p = new Node;

- head = new Node

- 之後一直增加下去

My Notes

Important Concepts worth keeping

單元四 定義語言

Today: / /

Language

- A set of string of symbols
- Examples: English, C++

Grammar

- The rules for forming the strings in a language
- Example: English grammar, C++ syntax rules

Symbols used in grammar

- $x|y$ means x or y
- xy or $x \cdot y$ means followed by y
(concatenate/append)
- $\langle \text{word} \rangle$ means any instance of word that the definition defines

Two Simple Languages

- Palindromes

• Language

$\Rightarrow \text{Palindromes} = \{w: w \text{ reads the same left to right as right to left}\}$

• Grammar

$\Rightarrow \langle \text{pal} \rangle = \text{empty string} \mid \langle \text{ch} \rangle \mid$

$a \langle \text{pal} \rangle a \mid b \langle \text{pal} \rangle b \mid \dots \mid Z \langle \text{pal} \rangle Z$

$\langle \text{ch} \rangle = a \mid b \mid \dots \mid z \mid A \mid B \mid \dots \mid Z$

My Opinions

Thoughts, inspirations, and suggestions

- Strings of the Form $A^n B^n$ • $A^n B^n$

\Rightarrow The string that consists of n consecutive A 's followed by n consecutive B 's

• Language

$\Rightarrow L = \{w: w \text{ is of the form } A^n B^n \text{ for some } n \geq 0\}$

• Grammar

$\Rightarrow \langle \text{legal-word} \rangle = \text{empty string} \mid$

$A \langle \text{legal-word} \rangle B$

你們的話，是，就說是；不是，就說不是。

《馬太福音》

9