

Thunderbirds Ventures Technical Test

Question 1

Write an app in js/ionic, swift or language of your choice, to take input from the phonebook, where phone numbers could be in any format, normalise numbers to the correct components including country code, area code and phone number itself. Additional requirements:

- If no country code / area code specified in the phonebook, use phone's current location to automatically guess the country code and area code
- If the input is determined to be a mobile number given a specific ruleset (e.g. anything starts with 9), skip the area code and just include the country code
- The demo app must compile and run on ios simulator / android simulator
- Import any public libraries as required

Question 2

Describe how you would structure a service architecture to handle a Facebook friend story feed / twitter feed, with 10,000 new updates per second and handle the display to 1M concurrent users.

- What can be done for optimal performance on client end
- How should the messages be distributed between clients, servers and databases
- How would the data be stored
- How can the response time be kept short for client requests
- What kind of hardware would you expect to use
- How can the service be kept up during earthquakes

Question 3

Solve this question in q. Q guide can be found at <http://code.kx.com/wiki/Tutorials> (Q for mortals)

Postman Pat is delivering letters to an infinite two-dimensional grid of houses.

He begins by delivering a letter to the house at his starting location, and then Jeff the Cat at the postoffice calls him via radio and tells him where to move next. Moves are always exactly one house to the north (^), south (v), east (>), or west (<). After each move, he delivers another letter to the house at his new location.

However, the Jeff the Cat back at the postoffice has had a little too much wine, and so his directions are a little off, and Postman Pat ends up visiting some houses more than once.

Given the input like (generate arbitrary input length)

v<v^v>^v<>>^><v>^<>v^>^<>^v^^^v^^>>vv<^^><^<vvv>^>^^<^>>^^^^v^<v>vv<>>v^v

How many houses received **at least one letter**?

For example:

> delivers letters to 2 houses: one at the starting location, and one to the east.

^>v< delivers letters to 4 houses in a square, including twice to the house at his starting/ending location.

^v^v^v^v^v delivers a bunch of letters to some very lucky people at only 2 houses.

Question 4

Solve in the language of your choice:

Little Kevin got a new video game for Christmas. It's an RPG, and he's stuck on a boss. He needs to know what equipment to buy at the shop. He hands you the controller.

In this game, the player (you) and the enemy (the boss) take turns attacking. The player always goes first. Each attack reduces the opponent's hit points by at least 1. The first character at or below 0 hit points loses.

Damage dealt by an attacker each turn is equal to the attacker's damage score minus the defender's armor score. An attacker always does at least 1 damage. So, if the attacker has a damage score of 8, and the defender has an armor score of 3, the defender loses 5 hit points. If the defender had an armor score of 300, the defender would still lose 1 hit point.

Your damage score and armor score both start at zero. They can be increased by buying items in exchange for gold. You start with no items and have as much gold as you need. Your total damage or armor is equal to the sum of those stats from all of your items. You have 100 hit points.

Here is what the item shop is selling:

Weapons:	Cost	Damage	Armor
Dagger	8	4	0
Shortsword	10	5	0
Warhammer	25	6	0
Longsword	40	7	0
Greataxe	74	8	0
Armor:	Cost	Damage	Armor
Leather	13	0	1
Chainmail	31	0	2

Splintmail	53	0	3
Bandedmail	75	0	4
Platemail	102	0	5

Rings:	Cost	Damage	Armor
Damage +1	25	1	0
Damage +2	50	2	0
Damage +3	100	3	0
Defense +1	20	0	1
Defense +2	40	0	2
Defense +3	80	0	3

You must buy exactly one weapon; no dual-wielding. Armor is optional, but you can't use more than one. You can buy 0-2 rings (at most one for each hand). You must use any items you buy. The shop only has one of each item, so you can't buy, for example, two rings of Damage +3.

For example, suppose you have 8 hit points, 5 damage, and 5 armor, and that the boss has 12 hit points, 7 damage, and 2 armor:

- The player deals $5-2 = 3$ damage; the boss goes down to 9 hit points.
- The boss deals $7-5 = 2$ damage; the player goes down to 6 hit points.
- The player deals $5-2 = 3$ damage; the boss goes down to 6 hit points.
- The boss deals $7-5 = 2$ damage; the player goes down to 4 hit points.
- The player deals $5-2 = 3$ damage; the boss goes down to 3 hit points.
- The boss deals $7-5 = 2$ damage; the player goes down to 2 hit points.
- The player deals $5-2 = 3$ damage; the boss goes down to 0 hit points.
- In this scenario, the player wins! (Barely.)

You have 100 hit points. The boss's actual stats are as below:

Hit Points: 104
Damage: 8
Armor: 1

What is the least amount of gold you can spend and still win the fight?

Turns out the shopkeeper is working with the boss, and can persuade you to buy whatever items he wants. The other rules still apply, and he still only has one of each item.

What is the most amount of gold you can spend and still lose the fight?