Course Project

Project, design and component specifications.

After you graduate from this course, you will gain experience of real-world projects, with real clients who want solutions (i.e. web-based systems) using industrial-strength tools (particularly Python, SQL). You will work in managed teams with defined schedules and regular meetings, and will use managed processes like agile development and version control.

Self organize and categories

Usually after you received a problem/task, the first step is try to describe the system as a set of user stories, possibly grouped in terms of user categories. You can watch this video and think about how you can do this.

Self analysis and priorities

You then need to define the priorities of the stories, at least mandatory or optional, or use the "Moscow Rule", which is: Must Have, Should Have, Could Have, Would Like to Have (where "Would Like to Have" is unlikely to be implemented).

Check terms and understandings

The third step is to define the terminology used by the clients, such as special names for kinds of data, special meanings for common terms or special names for particular functions which the system will need to implement.

For example, what is a business type? Different companies and clients may give different answers! Before you start building or detailed planning the system, make sure you have all the terms correct!

Detailed plan of your project

At this stage you can think of how to make the program. Which includes describing:

- The system data (what are the inputs?).

- The main classes/entities and why they are important (functionalities).
- The main relationships (how attributes and methods interact with each other).

You will also need to communicate with your client at this stage, in case the client adds more or removes some requirements, or you identified high risk areas of the program that you may not be able to complete.

A data dictionary may be sufficient or a class diagram could be included, if the client would consider it useful.

Implementing your project

Once you start to implement, many changes may still occur. Agile methods attempt to solve this problem of change (which will be covered in module 4, but you can look it up any time).

If the client is on site with developers, this allows continual discussion of requirements, which can be documented informally, such as a list of stories on a whiteboard. This requires a big time commitment as far as the client is concerned, and is only realistic for big projects.

For relatively small projects, development does not last very long and there is little likelihood of requirements changing later. Small projects cannot justify a big client commitment.

Phonebook project

Tasks/problem sheet

The problem sheet can be specific or generic. Your client may not know what they want, but just have a direction or a title with some basic ideas. It is your responsibility to dig further.

See the problem sheet below:

"BT is known for being the oldest communications company in the world, dating back to 1846. Today we're going to re-imagine, what it means to have a phone book in the 21st Century. With technology advances, we have now removed the need for those big Yellow Pages and BT Phone directories we used to get in the post. Instead, we now have Google at our fingertips.

With technology, take a moment to think what it means to have a phone book? Who are our primary users? What are their needs? And first of all what a phonebook means?

You have most likely built a phonebook app, when working in Python. But today we are starting from fresh! So you can be as abstract, adventurous and innovative as possible. We really want to push and rethink what it means to have a phonebook."

Research and gather ideas (yourself and with client)

Following the previous section's introductions, the second step is to analyse and categorize small tasks under this problem sheet.

Please note, if you received a very generic idea, you'd better double check with your client to get more information. If your non-functional requirements are not objectively measurable, you need to revise, rewrite or expand them!

If your client really does not have a clear clue and gives you a lot freedom, you can then do a brainstorm activity to analyse all kind of tasks first. You will then need to categorize those ideas.

However, in most cases your client may have some specific ideas, just probably not fully written down in the problem sheet, or they developed those ideas after they gave you the sheet.

For the Phonebook project, BT actually has a website, and your project in this module is to do some similar tasks to what the website does (hahaha yes, there is a website you can reference!).

Check out the BT phone book webpage https://www.thephonebook.bt.com/person/

Updated requirement

The requirement now becomes more specific and simpler:
We would like you to build a simple website that allows a user to search business type or person in a given range. E.g. input a business type and a location, return upto 50 results with business names and the businesses' information.

Decompose into user stories

After you are relatively clear on the topic and have general ideas of what to do, we will write the work ideas into user stories. A user story is a very high-level definition of a requirement, containing just enough information so that the developers can produce a reasonable estimate of the effort to implement it.

You can decompose those ideas starting with a Feature, which is written in the form of "In order to... As a... I Want to be able to...". These features are then broken down into Scenarios, which contain the "Given, When and Then" style.

BT teams may pass these requirements around in Word documents and emails or a software program called STORM. We will use Word documents in this course, but you and your team are welcome to try STORM in your own time.

Try to decompose it by yourself and see what you can list, based on the story above.

Detailed story cards

It is better to list the story cards as detailed as possible. Here is an example from a BT senior developer:

1.1 Find a Business

In order to be able to find a business,
As a web user,
I want to be able to search by Business type or by Business Name
AND be able to provide a location to narrow down the search.

1.1.1 Scenario: Search by Business type

Given I navigate to "Find a Business by type or name"

AND I see search by Business Type by default

When I specify Business Type and Location

Then I can view 50 search results

And view related Search results.

1.1.2 Scenario: Search by Business name

Given I navigate to "Find a Business by type or name"

And I click on "Business name"

When I search by Business name and Location

Then I can view 50 search results

And view related Search results.

1.2 Find a Person

In order to be able to find a person,

As a web user,

I want to be able to search for a person

AND be able to provide a location to narrow down the search.

1.2.1 Scenario: Search Person

Given I navigate to “Find a Person”

When I search by Surname and Location

Then I can view 50 search results

And view related Search results.

1.3 Sorted results (Distance, Name)

In order to be able to View Search results in a sorted order

As a web user,

I want to be able to select and view the search results in either Alphabetic order OR sorted by distance from search location.

1.3.1 Scenario: Sort by Distance/Default option

Given I navigate to "Find a Business by type or name"

When perform a search by Business by Type

Then I can view 50 search results

And by default, I can view the search results in order of distance from the given location.

1.3.2 Scenario: Sort Alphabetically

Given I navigate to "Find a Business by type or name"

When perform a search by Business by Type

And I click on the Name “(A-Z)”

Then I can view 50 search results

And by default, I can view the search results in alphabetical order.

Data structure for the Phonebook

The story cards help you identify main functionalities and relationships. You then need to consider what the system data is.

For an example data structure, let’s use the Phonebook Online data as a starting point. Please note you may need to add more, or not include everything from this list:

- Business/Last Name (or first and Last names for residential listings)
- Address Line 1
- Address Line 2
- Address Line 3
- Postcode
- Telephone Number
- Business Category
- X Coordinate
- Y Coordinate

Data tables

This will involve you building a database or finding an existing database (built in module 2).

Here are some guidelines if you would like to build relational tables:
E.g. for only two tables:

1. Business type, Business name, location, tel
E.g. Hairdresser, Taylor Taylor London - Notting Hill Hairdresser, W10 5TD, 0001

2. Surname, first name, location, tel
E.g. Patuck, Lil, EC2A 4BX, 0002

So we can distinguish people from businesses and given they share different data attributes.

Details:
1. Business type lookup table : reference table. Should inc. a business type Id, business type name and description. Used as lookup only.

2. Location: you may wish to use postcode in the other tables and here have a postcode to latitude and longitude lookup.

Design program
Other than the data in the database, what other data will you need? User input?

From a coding point of view think about what is the input, and what is the output. Write a generic test to guide you and think about the code structure.

Examples:
Input: Business type, location (postcode), Option 1 or 2
Output: Business name, location, tel

- Option 1, return: 50 results sorted by distance
- Option 2, return: 50 results sorted by Business name alphabetically

Please do have a think about other possibilities. Also for the find a person scenario too.

Pseudo code:
Write some pseudo code to generate ideas and build the system structure. In the meanwhile think about what to test in each stage of the pseudo code.

Distance measure
Here are tips to measure distance between two points:

1. **Euclidean distance (if it is a very short distance)**
   dlon = lon2 - lon1

dlat = lat2 - lat1
Dist = (dlon**2+ dlat **2)**0.5

2. **Haversine distance**
   dlon = lon2 - lon1
   dlat = lat2 - lat1
   a = (sin(dlat/2))**2 + cos(lat1) * cos(lat2) * (sin(dlon/2))**2
   c = 2 * atan2(sqrt(a), sqrt(1-a))
   d = R * c (where R is the radius of the Earth)

Think about how you are going to do this in a python class.
At the same time, consider how can you get those point through location information?

API for getting the lon lat distance
Map APIs are simple great tools for getting lon and lat points from a postcode. Find out how to convert a postcode to coordinates (x, y) by yourself.

1. Bing map API (allow commercial use, if you would like to expand and make use of it in the future).
2. Google map API
3. https://postcodes.io/

Website display (optional)
Ok, so our project is to build a simple website with the above functionalities, and you have three options for how to do this:

Option 1>
Create a HTML form for the search query, read with JavaScript/jQuery and then pass the requested search info to Python.

Option 2 >
Python flask.

Option 3>
Both? Search info for translating JS to flask. Or find your own way.

Summary

This is the guidance for the phonebook project. Make sure to check you understand everything, and good luck!