475 Software Engineering for Industry : Topic 2
Software Architecture

Assessed - work in a group of 3.

In this exercise we will design a software architecture for a given application, considering various differing requirements and stakeholders. We will try to represent our architectural decisions using models and diagrams, and then discuss various candidate architectures in the class.

Reading

Rozanski and Woods have developed a system of *viewpoints* and *perspectives* which represent a number of different concerns that a software architecture may address:
http://www.viewpoints-and-perspectives.info/vpandp/wp-content/themes/secondedition/doc/VPandV_WhitePaper.pdf

Simon Brown presents a more developer-centric angle on software architecture in his book Software Architecture for Developers and particular has developed the C4 Model.

Practical

You don't need to write any code for this week's exercise. Design a software architecture to address the needs in the following scenario. Pick a particular aspect of the software architecture (don't try to cover everything) and represent it using whatever type of diagram and/or model you think works best to show what you want to show. You could do diagrams on a computer, by hand (neatly), or even create a model in code. Choose whatever you think is the most appropriate method.

Scenario

The Royal Albert Hall want to develop a new booking system for tickets. The hall hosts many different types of events, concerts etc and has a capacity of around 5000 seats. Customers can buy tickets online, by phone, or in person at the box office. For online or telephone booking, tickets are printed and delivered to the customer's home address.

Conscious of their brand, the Royal Albert Hall have all the normal concerns about security and privacy when selling online. They are also concerned about availability of the system and want to make sure the website it always up and responsive. However at the same time they are naturally concerned about costs of developing and running the new system.

Generally, there are a few hundred bookings per day. But, on some days, a lot more people try to book. For example, recently when booking for the BBC Proms opened, around 300,000 new tickets went on sale and customers visiting the website got messages like:

Thank you for visiting the Royal Albert Hall's website. You are currently in a queue as we are experiencing a high demand for BBC Proms ticket purchases.
You are currently number 6399 in the queue.

or

ROYAL ALBERT HALL WEBSITE IS FULL
We are currently experiencing a very high demand for BBC Proms ticket purchases.
Thank you for your patience during this busy time. We recommend you visit us again in a short while. We do have an online queuing system in place, so that as many users as possible may buy tickets fairly in order of queuing, but this is currently full.

One of the main objectives for the redesign is to deal with these problems and to provide a smoother booking experience for customers.

Here is a short functional specification - the system should support:

- displaying the programme of events and letting the user browse and search
- checking availability of tickets for a performance
- booking tickets for a performance
- choosing seats as part of the booking process, or have them allocated for you
- taking payment for the booking (via a 3rd-party payment provider like Visa)
- tracking an order which is being delivered to you (via a 3rd-party delivery service like DHL)

Stakeholders and External Forces
Who are the external entities in this system? (think about integration with 3rd-party systems)
Who are the stakeholders? Who is interested in the architecture description, and why?
What other quality properties might be important in a system like this, and how would you achieve them?

Writing

Once you have made some progress with the design part, write up a summary of your thoughts on software architecture. The submission should be 2 pages (no covers or contents pages please).

On page one, address one of the following questions:

- What does a software architect do?
- Agile development discourages Big Design Up Front, is this a conflict with architectural design?
- Should software architects write code?

This is not a long essay, just a short statement of your thoughts, with supporting evidence and references. Try to focus on your points and be interesting!

The ideal length is around **300 words**. References can be extra, but everything must fit on one page. Do not use a tiny font and tiny margins, it is better to write less and trim out anything unnecessary.

On page two, give an appropriate representation of the software architecture you have designed for the ticketing system (e.g. some diagrams). You don't need to show all the different aspects of the software architecture, pick a couple that are interesting to you.

Submission As a group, submit a pdf (`topic2.pdf`) of your 2-page write-up via CATE.

Deadline Monday 28th Jan, 9am.

Note that the deadline is Monday at 9am - i.e. in the **morning**. We suggest you think of it as midnight Sunday.

Discussion

During the class on Tuesday 29th Jan, we will discuss your thoughts and experiences. We will ask some groups to briefly present their architecture, and others to describe their thoughts. We hope for a good discussion amongst the class.

Schedule

Monday 21st Jan exercise released
Friday 25th Jan (9-11am) - lab session (lab 219).
Monday 28th Jan (9am) - deadline for submission to CATe.
Tuesday 29th Jan (11am-1pm) - discussion class (lecture theatre 340).

The actual design you come up with and page 2 of the submission are not graded, but you must demonstrate that you have done something reasonable for that part in order to have page 1 graded.

On page 1 we are looking for you to express your thoughts and ideas based on your reading, experience and discussions, backed up by evidence. The grading scheme is as follows:

Assessment

In your written work we are looking for you to express your thoughts and ideas based on your reading, experience and discussions, backed up by evidence.

F- E
Little or no understanding of the given topic demonstrated.

D
Shows an incorrect or flawed understanding of how or why to apply the given tools/techniques.

C
Shows a reasonable, but limited, understanding of the application of ideas and techniques covered, and the context in which they apply.

B
Shows a good understanding of how to apply these techniques and the problems that they solve. Arguments are well presented and backed up by references.

A
Displays a broad understanding of the use of these techniques, comparing different approaches and the forces that might make them suitable for different situations, displaying evidence of further independent reading and thought, beyond what was suggested and covered in the class.

A*
Gives an excellent and insightful commentary, comparing different tools and approaches and displaying evidence of further independent reading and thought. Demonstrates critical thinking and considered opinion, but backed up by references and practical experience.