Software Engineering (Adv CS II, 320212)

Final Exam Spring 2015

Logistics

- You have 75 minutes for the test.
- Write down all your answers in the examination booklet.
- Mark all sheets you deliver with your name to make sure it can get graded. We cannot grade if not present or illegible!
- *Take it slow and avoid rushing to mistakes! Different problems test different skills and knowledge, so do not get stuck on one problem.*

Name:

(To be used for correcting, do not write into box below)

Task	1.1	1.2	1.3	1.4	2.1	3.1	3.2	4.1	4.2	4.3	5.1	5.2
Total	2	1	2	2	3	3	3	6	3	2	4	3
Reached												

Task	6.1	6.2	7.1	7.2	7.3	7.4	8.1	8.2	8.3	8.4	8.5	8.6	**Total**
Total	4	1	3	3	4	3	5	3	3	4	6	3	**76**
Reached													

1.Defensive Programming

The following code is used to handle SSL key exchange verification. There is a very dangerous bug inside this code. Another module checks the err value and if a non-error value is returned, it is assumed that all operations were successful.

NOTE: It is NOT necessary to understand all the technicalities of SSL/TLS in order to complete this section.

```
static OSStatus
    SSLVerifySignedServerKeyExchange(SSLContext *ctx, bool isRsa, SSLBuffer signedParams,
                uint8_t *signature, UInt16 signatureLen)
    {
        OSStatus    err;



        if ((err = SSLHashSHA1.update(&hashCtx, &serverRandom)) != 0)
            goto fail;
        if ((err = SSLHashSHA1.update(&hashCtx, &signedParams)) != 0)
            goto fail;
            goto fail;
        if ((err = SSLHashSHA1.final(&hashCtx, &hashOut)) != 0)
            goto fail;


        //...other error checks in if statements omitted


    fail:
        SSLFreeBuffer(&signedHashes);
        SSLFreeBuffer(&hashCtx);
        return err;
}
```

Task 1.1 (2 pts) What is the major bug in the code? Explain how the bug affects the code and what are the consequences with regards to the intended operation of this code sample.

Task 1.2 (1p) What kind of simple element of coding culture etiquette would have solved such an issue or prevented it from happening in the first place?

Task 1.3 (2p) What tool used in programming should have alerted the developers about this error, at least through a warning?

Task 1.4 (2p) Name two advantages of structured programming.

2. Maintenance

Task 2.1(3p) Write a proper bug report about a bug of your choice. The report should be reproducible and specific.

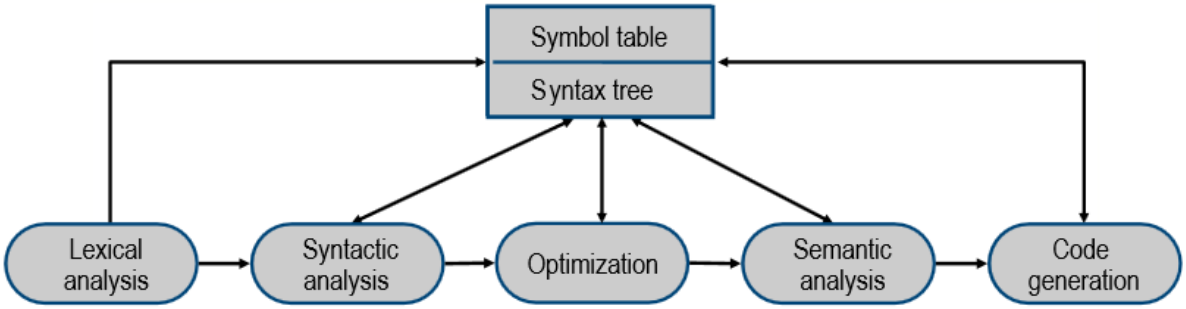
3. Documentation

Task 3.1(3p) One of the interns at your project is not sure about how much comments to put on code, what to comment and what not. You as a project manager should explain to him which statement should he comment on and how comments can lead to problems.

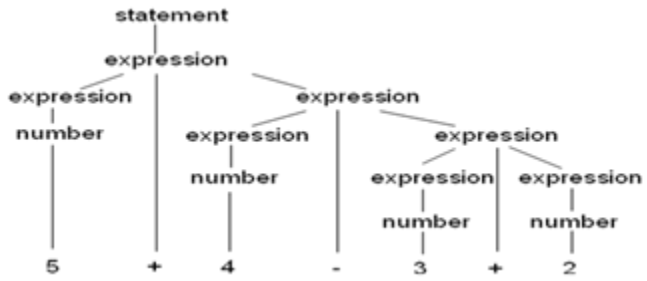
Task 3.2(3p) Briefly describe external documentation and user documentation. What is the difference between them?

4. Language Processing

Task 4.1(6p) For the following data flow of the compiler very briefly explain the purpose of each of the components. (Exclude Optimization))



Task 4.2(3p) Generate a Bison rules section from the given parsing tree. Assume that, +/- are the only operators to be parsed.



Task 4.3(2p) For each of the following determine if it is a semantic or a syntactic error and provide the reasoning behind.

a) The code runs in C++ but in python it returns an error
b) The code runs, but it does not return the expected result

5. Web Enabled Information Systems

Task 5.1(4p) You as a project manager need to create a Web App for a university library. You have decided to use a three tier Architecture. You need to explain to your boss the architecture and why would it be wise to use this method.

Task 5.2(3p) Name three attributes specific to Web Apps and explain them.

6. GUI Technology

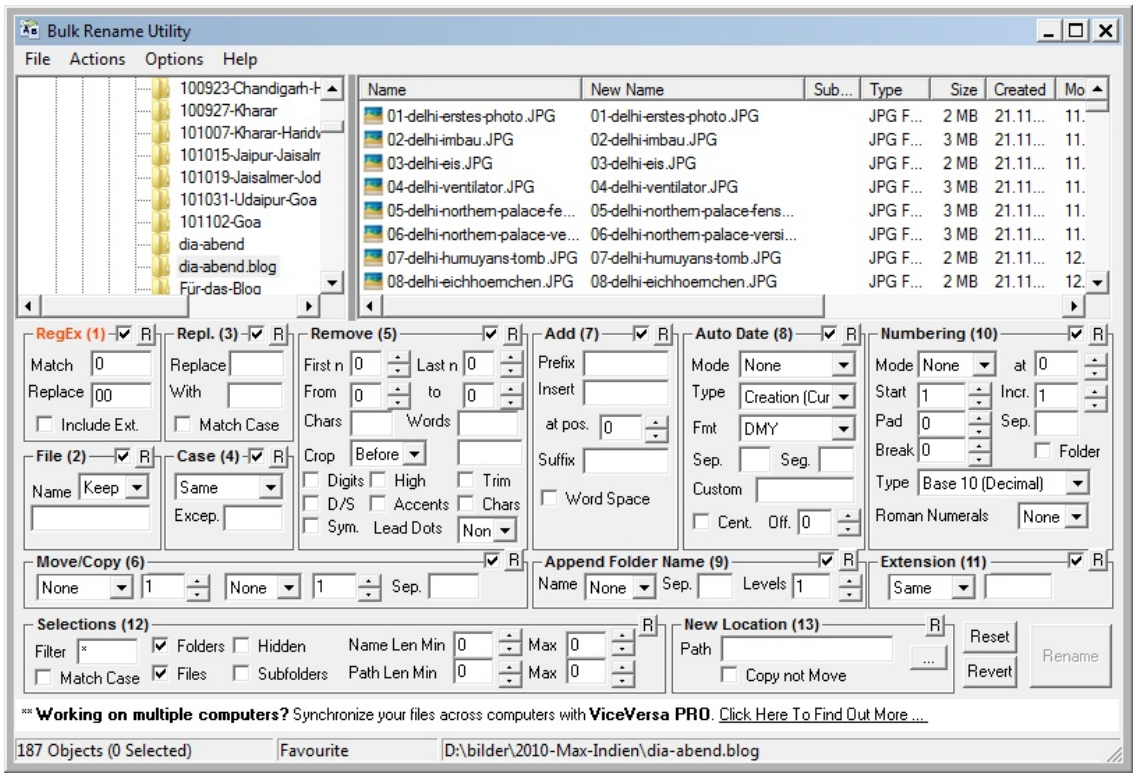
Task 6.1(4p) Explain the MVC Architecture using a calculator application. Explain the task of each component based on this proper case.

Task 6.2(1p) Explain the core idea of Event Driven Programming.

7. Design, UI , Web and Web Patterns

Task 7.1(3p) What are Pressman's Golden Rules? For each rule come up with an example where this rule is violated.

Task 7.2(3p) For the input box below describe which of the Pressman rules are adhered to and which not, and indicate why.



Task 7.3(4p) How can we measure the quality of a website? Provide 4 dimensions and explain them.

Task 7.4(3p) Explain the GUI pattern called Process Funnel (with the help of a sketch). What is the Desktop solution for a Process Funnel?

8.Project and process management

Task 8.1 (5p) Build a PERT chart from the table content given below (hint: you can leave out milestones and link tasks directly). Provide a definition of the “critical path” and identify it on your PERT chart enclosing it in a dashed line (- - - - -) or listing the tasks on it. (table on next page)

Task	Duration (days)	Dependencies
T1	8	
T2	17	
T3	20	T1
T4	13	T3
T5	22	T2, T3
T6	14	

Task 8.2 (3p) Define the following terms:

Risk

Milestone

Deliverable

Task 8.3 (3p) Based on the classification given in Kal Toth's paper "Which is the Right Software Process for Your Problem?", name the two best suited process models to develop a software system where requirements are expressed by an unexperienced analyst in a few pages with little input from the user. Base your selection only on "Requirements Uncertainty" and explain your choice accordingly.

Task 8.4 (4p) In this course, two cases have been discussed where the Ada construct "pragma suppress" has caused a catastrophe. What are the technical reasons in each case, and why was the root cause not prevented upfront by management? **Relate both cases to the term "software quality".**

Task 8.5 (6p): For the example situations below, which software process model would you pick and why?

a) A software system that handles the security checks for a security company. The requirements are very well defined by the standards of the company.
b) A software for a dance contest in College III. The schedule is tight and you have nothing written yet. The College Master has told you what the software must accomplish in general, but he can require more or less functionalities afterwards. He is not interested about internal workings of the software as long as the software produces the required output for a given input.
c) A management software architecture for a large multi-national company. The requirements are clearly set by management following a very long design process and the executive board wants to see proof of that their specifications are being followed at certain milestones.

Task 8.6 (3p): What is Capability Maturity Model Integration (CMMI)?