Software Engineering: Course Guide

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Learning Steps and Resources:

As a student of "Software Engineering" you are expected to do the following:

1. Study the theory, that is provided in the form of slides (in English and in Portuguese, as you need/prefer: the relevant information is the same in both languages). It is very important (it is mandatory, by ISMT rules) that you have access to the Moodle area of the course. There you can find the theoretical materials.

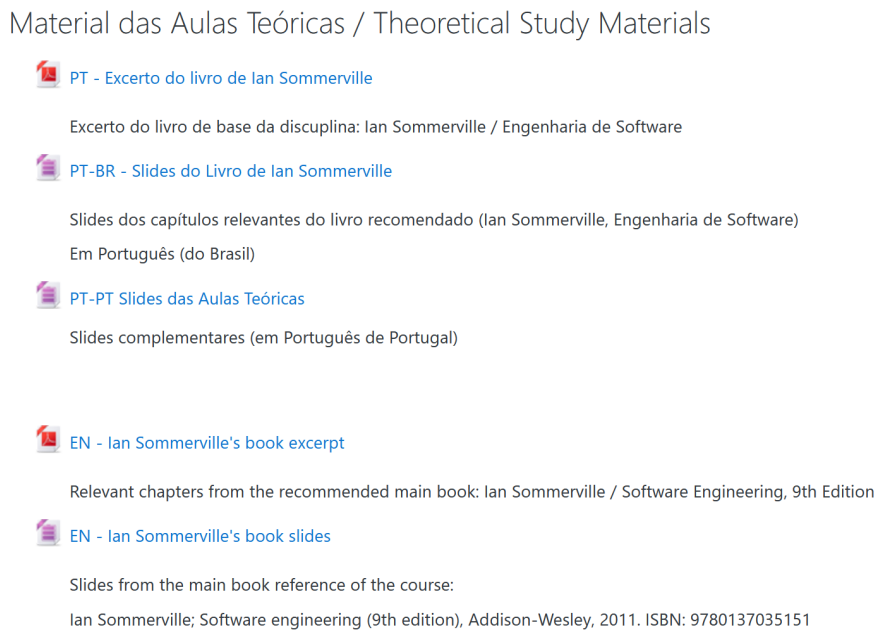


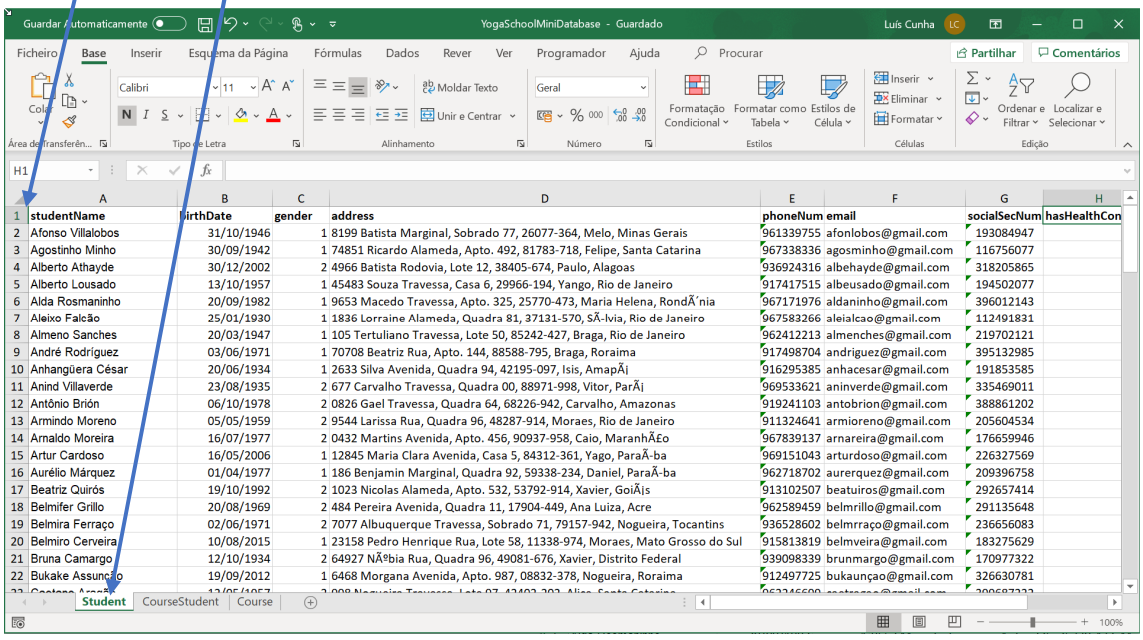
Figure 1. Theoretical Materials in Moodle

[1] I do use WhatsApp: don't hesitate to ask me my phone contact through email. Typically, I have a WhatsApp group with the students of each year, to communicate about course-related topics. Also, I am available to meet through Zoom (etc) on an arranged scheduled day/hour.

The password to access courses in Moodle is typically the initials of the course (e.g. “es” for “Engenharia de Software” (Portuguese for “Software Engineering”): in case you don’t have access, you must contact the academic services (every student, including Erasmus students, receive information on how to enter Moodle). If you followed the instructions that ISMT gave you, and you still can’t access the Moodle area of the course, please contact me via email, so that we can sort out the problem. It is really very important that you can enter in the Moodle area.

In Moodle you can also find other useful information, such as links for excellent video on YouTube (that I recommend), or links for videos made by me (I have videos showing how to do practically everything required in the course step by step: if you don’t have access to them, you are losing information that could help you significantly, don’t let that happen 😊).

2. Think about a real or imaginary client, that needs you to write software for him/her/it. You must create **three** simple **data tables** (at least, but it really is enough), containing relevant data fields for the software your client needs. The data can be from the real world or invented by you. You start by creating an Excel document, in which each table is on a different “sheet”, and the first line in each sheet contains the fields names for that table:



	A	B	C	D	E	F	G	H
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5	Alberto Lousado	13/10/1957	1	45483 Souza Travessa, Casa 6, 29966-194, Yango, Rio de Janeiro	917417515	albeusado@gmail.com	194502077	
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8	Almeno Sanches	20/03/1947	1	105 Tertuliano Travessa, Lote 50, 85242-427, Braga, Rio de Janeiro	962412213	almenches@gmail.com	219702121	
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10	Anhangüera César	20/06/1934	1	2633 Silva Avenida, Quadra 94, 42195-097, Isis, AmapÃ¡	916295385	anhacesar@gmail.com	191853585	
11	Anind Villaverde	23/08/1935	2	677 Carvalho Travessa, Quadra 00, 88971-998, Vitor, ParÃ¡	969533621	aninverde@gmail.com	335469011	
12	Antônio Brión	06/10/1978	2	0826 Gael Travessa, Quadra 64, 68226-942, Carvalho, Amazonas	919241103	antobrion@gmail.com	388861202	
13	Armindo Moreno	05/05/1959	2	9544 Larissa Rua, Quadra 96, 48287-914, Moraes, Rio de Janeiro	911324641	armioreno@gmail.com	205604534	
14	Arnaldo Moreira	16/07/1977	2	0432 Martins Avenida, Apto. 456, 90937-958, Caio, MaranhÃ£o	967839137	arnareira@gmail.com	176659946	
15	Artur Cardoso	16/05/2006	1	12845 Maria Clara Avenida, Casa 5, 84312-361, Yago, ParaÃ-ba	969151043	arturdoso@gmail.com	226327569	
16	Aurélio Márquez	01/04/1977	1	186 Benjamin Marginal, Quadra 92, 59338-234, Daniel, ParaÃ-ba	962718702	aurerquez@gmail.com	209396758	
17	Beatriz Quirós	19/10/1992	2	1023 Nicolas Alameda, Apto. 532, 53792-914, Xavier, GoiÃ¡s	913102507	beatuiros@gmail.com	292657414	
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22	Bukake Assunção	19/09/2012	1	6468 Morgana Avenida, Apto. 987, 08832-378, Nogueira, Roraima	912497725	bukaunçao@gmail.com	326630781	

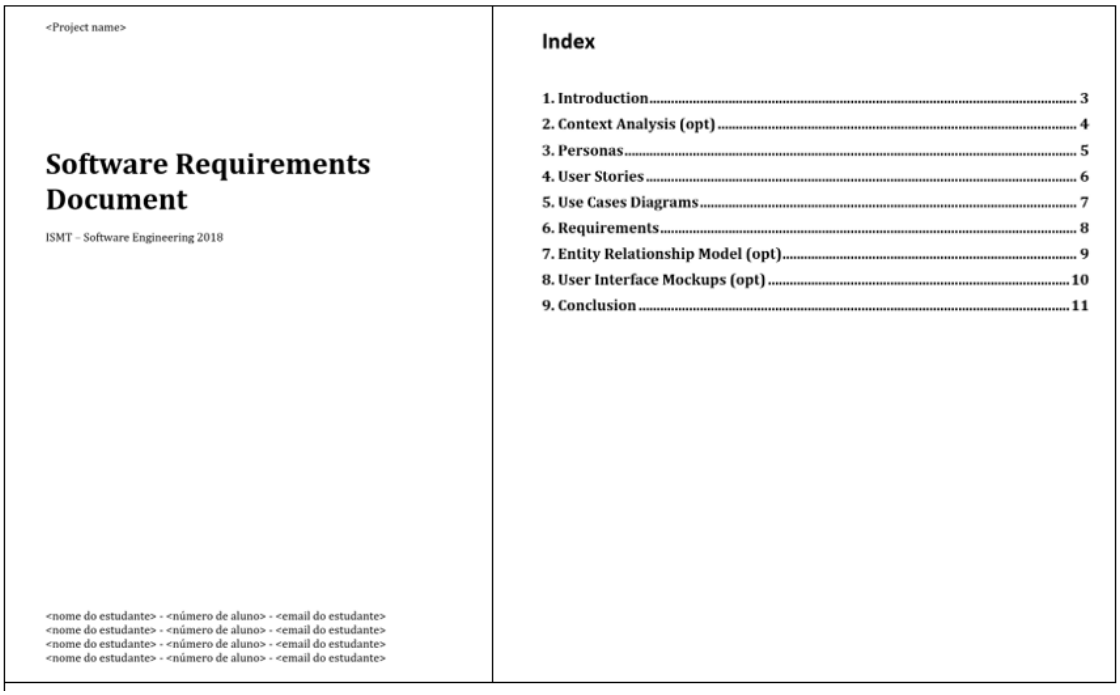
Figure 2. Example of an Excel document with three data sheets. You must create your own sheets and data

3. Write three reports, each due on a given date: in each chapter, you apply what you learn by studying the materials provided in Moodle (and talked about in Class and shared videos).

One thing you must pay attention (for your advantage 😉), is that the reports are continuations of each other. Report 2 picks on Report 1, and Report 3 picks on Report 2. So, from the beginning, you are actually doing one single report.

The templates for each of these reports are in Moodle: it is essential that you use those templates, and that you deliver what is required in each of them on schedule (due dates for each of the three reports is in Moodle).

3.1. The first report (Figure 3) concentrates on basic software engineering topics. In ISMT those topics ("Personas", "User Stories", "Use Case Diagrams", "Requirements") are covered in a previous course called System Analysis. Software Engineering builds on that course, and that is why we don't focus much on those themes. However, there is information in Moodle about how to do user stories, how to make a good use case diagram, etc.



<Project name>

Software Requirements Document

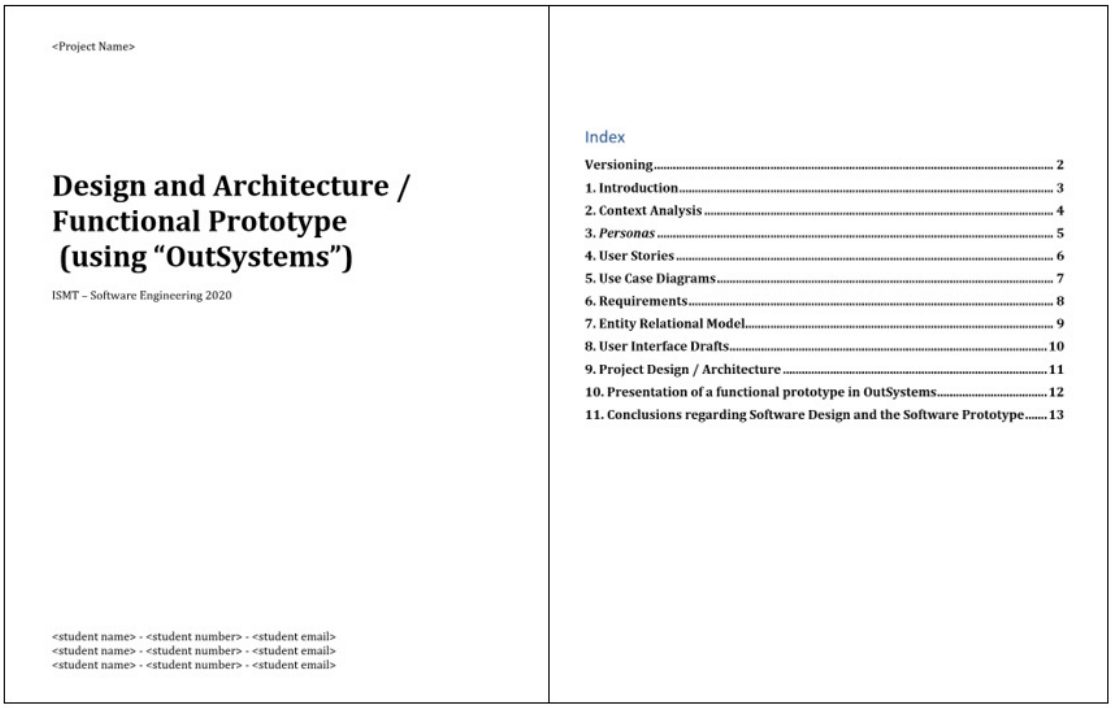
ISMT – Software Engineering 2018

<nome do estudante> - <número de aluno> - <email do estudante>
<nome do estudante> - <número de aluno> - <email do estudante>
<nome do estudante> - <número de aluno> - <email do estudante>
<nome do estudante> - <número de aluno> - <email do estudante>

Index

*Figure 3. Structure of the **first report**. "Opt" means that for this report that chapter is optional. Note the emphasis on basic software engineering concepts and tools (personas, use case diagrams, user stories).*

3.2. The second report (Figure 4) presents the work done with OutSystems, a "low code" platform created by a Portuguese Company, now based in Silicon Valley. If you have never heard of them, look at their website (where you can see some of their clients, ranging from Mercedes to Intel or Vodafone). Video guidance is provided on how to use OutSystems. I use an Excel document with three sheets (like the one on Figure 2) as an example. You only must follow the video using your own data instead.



<Project Name>

Design and Architecture / Functional Prototype (using "OutSystems")

ISMT – Software Engineering 2020

<student name> - <student number> - <student email>
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<student name> - <student number> - <student email>

Index

Figure 4. ***Second report****, that builds on the first one, and adds the chapters for the work done using OutSystems*

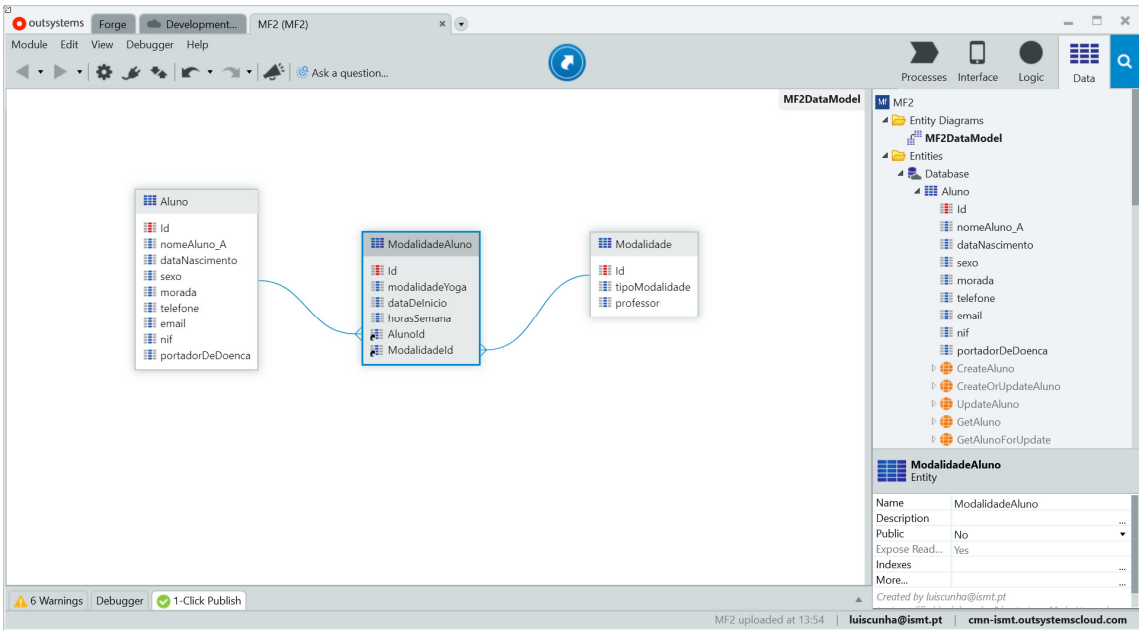


*Figure 5. OutSystems Development Environment. Note the separation of "Interface", "Logic" and "Data" areas, on the top right. This is very nice from a pedagogical perspective (they follow a well-established "design pattern" called MVC, from "**M**odel-**V**iew-**C**ontroller"). Also, notice how you can extract the image for Chapter 7 of the report (ER Model) from this screen.*

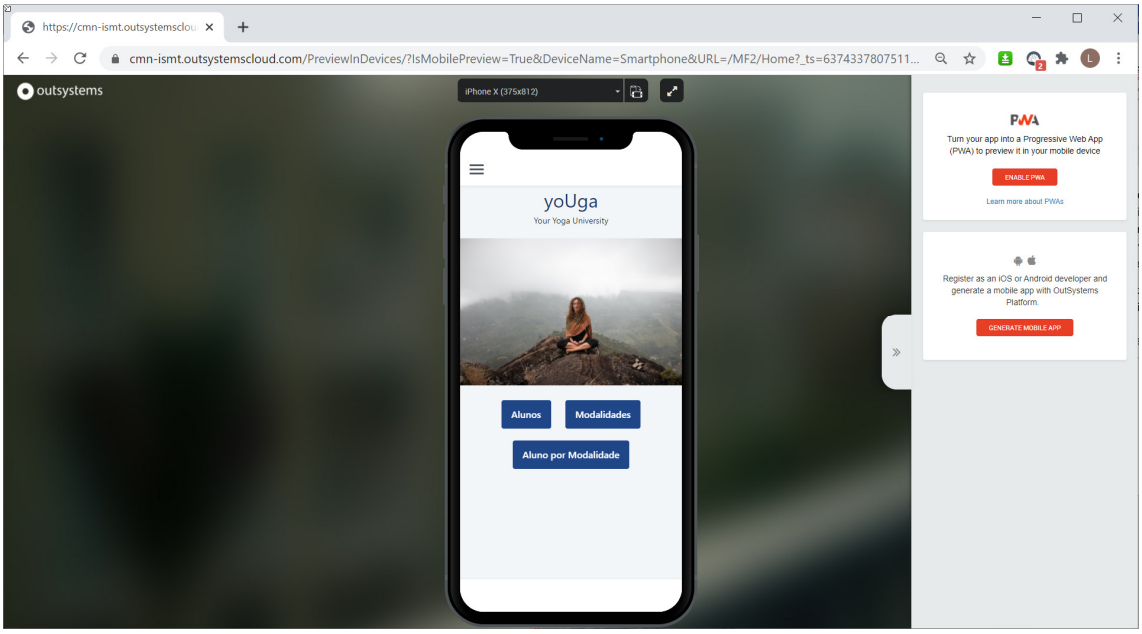


Figure 6. Example of a Mobile App running in an iPhone X. We use the free learning license provided by OutSystems to learn how to use their platform, but also to make functional prototypes in a very fast (and very rewarding) manner.

3.4. The third (and final) report (Figure 7) adds Chapters 12 and 13 (Chapters 14 and 15 are not "technical", they are meant to make you reflect on everything you learned doing all the steps of the project).

Chapter 12 is where "you prove" that you were able to do your application run using Java+Spring+vaadin. Contrary to OutSystems, these tools are less forgiving and more demanding, technically. In order to uniformize our development environments, a VirtualBox machine is provided, with all the tools (JDK, Spring, vaadin, Netbeans, MySQL) pre-installed as well as a video, explaining how to use them (I had to use Linux/Ubuntu because of licensing issues related to distributing the virtual machines to you).

In **Chapter 13**, you do an analysis of the structure of the code: I expect you to be able to explain what each of the classes does (for example the class "AlunoForm" in Figure 8). I am also expecting that you gain an understanding the general organization of the code inside the project (Figure 9). In your analysis you should cover such things as a) why is there an "AbstractEntity", b) what is the role of a "repository", or a "service", or a "view", c) how does it happen that we are writing plain Java and we are able to get a modern Web frontend (without writing a single HTML/CSS/js line), d) how are we interacting with a proper relational database (MySQL, etc) without using SQL statements, although we are clearly changing the database when we create, update or delete data, e) why are there packages that have "backend" on their name.

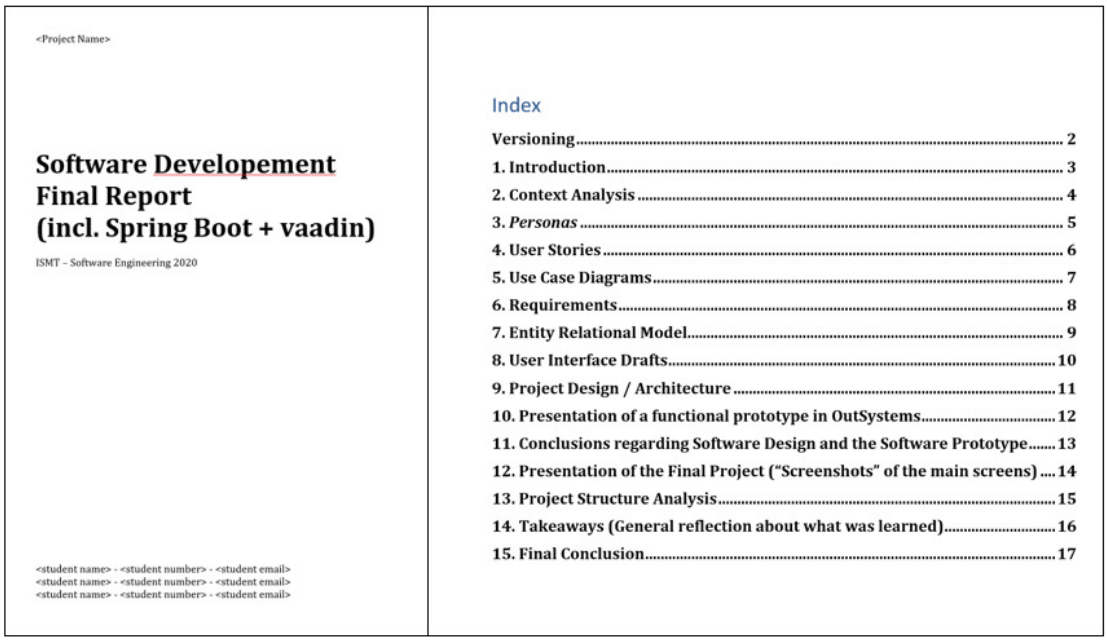
You will be asked about the contents I mention for Chapter 13 in the oral defence of the report. Please, make sure you understand all the concepts well.

Please note: taking into account that what I am asking in Chapter 12 is relatively challenging, even providing a virtual machine pre-configured with all the tools, this year I decided not to introduce a major penalty if a student/group is unable make their project fully functional. But I will be available to provide all the assistance that you require, and with a virtual machine serving as a common ground, I am very optimistic about everyone of you being able to end the course with a functional Java/Spring project.

And, even if your code isn't in a running state by the end of the schedule, you should write a good Chapter 13: you must demonstrate that you understand what your code should do, even if you face any technical challenge that prevents you from delivering a fully functional product.

It is perfectly possible to have a good grade (e.g. 17/18), if every chapter of the report is very well done, except for Chapter 12. At the same time, if someone can make the Java project run but has a very poor report on the remaining chapters, he/she would get a very low grade.

Having a fully functional Java+Spring+vaadin is “the cherry on top of the cake”, but this is a Software Engineering course, and every chapter in the report is very important.



<Project Name>

Software Developement
Final Report
(incl. Spring Boot + vaadin)

ISMT – Software Engineering 2020

<student name> - <student number> - <student email>
<student name> - <student number> - <student email>
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Index

Figure 7. Structure of the final report. For the final product, we use Java, with the Spring and vaadin frameworks.

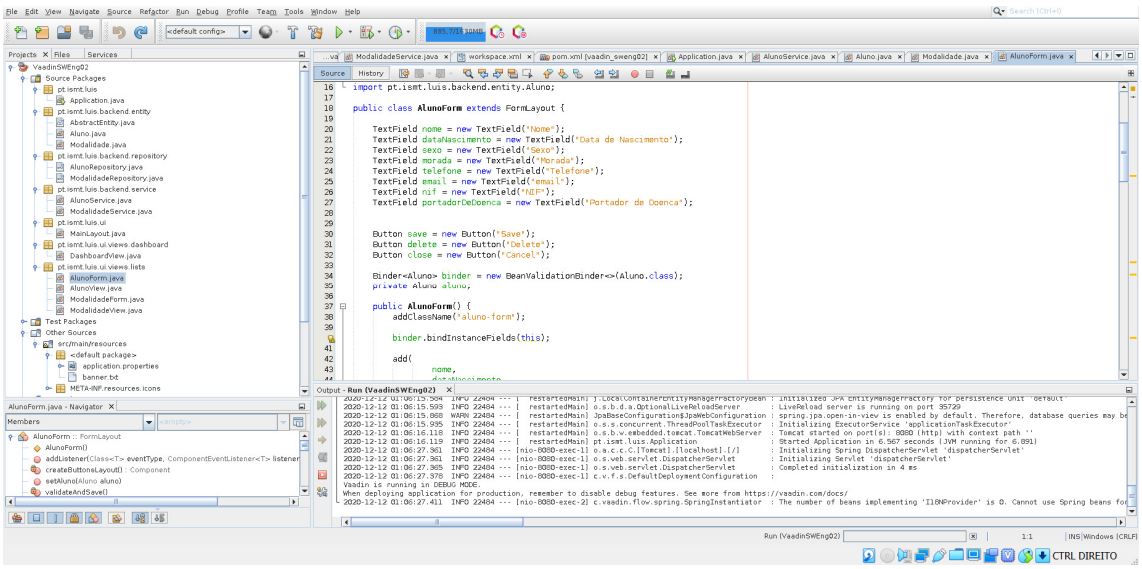

Figure 8. Example of one of the project classes ("AlunoForm"). You should be able to explain what is the role of each class (Note: “AlunoForm” in English would be “StudentForm”: everything that is in Portuguese is being converted, I sorry for the inconvenience, and please feel free to ask whenever in doubt).

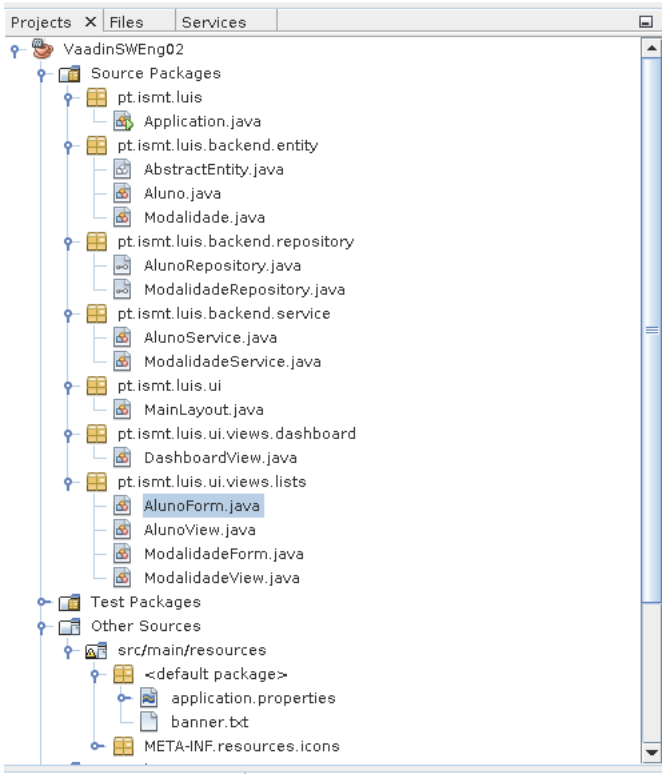

Figure 9. General structure of the Java+Spring+vaadin project. You should be able to explain this organization of your own code (even if you couldn't make it run), where should a person go to change the database properties (it's on "application.properties" 😉, but that file may not be easy to find if you don't know where to look)