FACULTY OF INFORMATION TECHNOLOGY CTU IN PRAGUE

Supervisor's statement of a final thesis

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Thesis title:	Alternative Network Layers in OpenStack
Branch of the study:	Computer Systems and Networks

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Evaluation criterion:	*The evaluation scale: 1 to 4.*
1. Fulfilment of the assignment	*1 = assignment fulfilled,* *2 = assignment fulfilled with minor objections,* *3 = assignment fulfilled with major objections,* ***4 = assignment not fulfilled***

Criteria description:
Assess whether the submitted FT defines the objectives sufficiently and in line with the assignment; whether the objectives are formulated correctly and fulfilled sufficiently. In the comment, specify the points of the assignment that have not been met, assess the severity, impact, and, if appropriate, also the cause of the deficiencies. If the assignment differs substantially from the standards for the FT or if the student has developed the FT beyond the assignment, describe the way it got reflected on the quality of the assignment's fulfilment and the way it affected your final evaluation.

Comments:

I must, unfortunately, judge the thesis assignment as unfulfilled, because the work deviated from the letter of the assignment. However, there are other qualities which will allow me to give it a passing grade, which will become apparent later. To this point of the evaluation:

1. Research the available implementations. With the open-source ones, focus not only on functionality but also on development status, user base, and deployment options.
NOT fulfilled - There is no chapter researching the alternate network layers of OpenStack, only the subchapter 3.5 with about one page of text. This should have been the focus of the thesis.

2. Choose a few of them (e.g. 2 and the default one) and install them on your or provided hardware. An OpenStack deployment supporting the selected solutions will be required. During the installation, observe high availability features, if any.
50% - Only one other solution was tested using DevStack on a laptop. There is no discussion of HA or the component structure in general.

3. Evaluate their features and benchmark their performance. Document the observed stability during the benchmark and prolonged operation.
33% - There really is no evaluation of features. I do consider the benchmark of a distributed networking solution on a single node as only the concept of the measurement. No real data has been produced. No discussion of stability.

Evaluation criterion:	*The evaluation scale: 0 to 100 points (grade A to F).*
2. Main written part	*75 (C)*

Criteria description:
Evaluate whether the extent of the FT is adequate to its content and scope: are all the parts of the FT contentful and necessary? Next, consider whether the submitted FT is actually correct – are there factual errors or inaccuracies? Evaluate the logical structure of the FT, the thematic flow between chapters and whether the text is comprehensible to the reader. Assess whether the formal notations in the FT are used correctly. Assess the typographic and language aspects of the FT, follow the Dean's Directive No. 26/2017, Art. 3. Evaluate whether the relevant sources are properly used, quoted and cited. Verify that all quotes are properly distinguished from the results achieved in the FT, thus, that the citation ethics has not been violated and that the citations are complete and in accordance with citation practices and standards. Finally, evaluate whether the software and other copyrighted works have been used in accordance with their license terms.

Comments:

The thesis text mostly focuses on the overview of OpenStack cloud operating system and the networking component, Neutron. There also is a chapter on the theory of Software Defined Networking and the major open-source implementation, OpenVSwitch. These chapters are very good reading for those not familiar with the technology.
Chapter 3 details the deployment option of OpenStack and the way it is configured. In my opinion, it contains excessively long lists of configuration options and printouts. But it may be interesting reading for some.
Chapter 4 presents the measurement methodology for a single-node setup. To be complete, it misses scenarios of East-West communication between VMs on different physical hosts. Also, North-South traffic should actually be leaving the node in the direction of the Internet on a physical network card.
Chapter 5 then presents the results of measurement of two network solutions. The measurement is relative at best, because there is no baseline in the form of a physical network connection. The measurement was conducted in a quite exotic environment of nested virtualization - Linux under KVM on Linux under VirtualBox on Windows. In the middle layer, the Neutron SDN solution has created a non-trivial amount of virtual network devices (see the figure on page 26), while Calico should not have. The impact of those differences should have been measured, but the nested virtualization and the fact that the base network connection was a VirtualBox VSwitch, which hasn't been baselined either, pretty much invalidates the results.
A chapter is missing on the Alternate SDN Solutions.

The logical structure of the text is good. There are quite frequent typos. Regarding the English, there are sometimes wrong word choices. In some cases, it is just informal language (this is the first time I have seen the phrase "nitty-gritty", moreover in an academic text), sometimes it changes the meaning so that a statement is incorrect (e.g. page 29: "each instance resides on a similar network" should have been "all instances reside on the same network"). The print quality of images is not good, and also typographically, they overflow the page margins.

The image sources are not cited and the images are not referenced in the text. If they are, the numbering does not match. Otherwise, the citations seem to be correctly applied. The reference list is quite long for a thesis of this size and even contains 2 books and 1 scientific article. However, its formatting is poor. It was most probably not done using LaTeX tools. The Acronym list is incomplete.

Evaluation criterion:	*The evaluation scale: 0 to 100 points (grade A to F).*
3. Non-written part, attachments	*75 (C)*

Criteria description:
Depending on the nature of the FT, comment on the non-written part of the thesis. For example: SW work – the overall quality of the program. Is the technology used (from the development to deployment) suitable and adequate? HW – functional sample. Evaluate the technology and tools used. Research and experimental work – repeatability of the experiment.

Comments:

There is nothing that is not contained in the text, except configuration files with minimal changes and the measurements in tabular form.

Evaluation criterion:	*The evaluation scale: 0 to 100 points (grade A to F).*
4. Evaluation of results, publication outputs and awards	*50 (E)*

Criteria description:
Depending on the nature of the thesis, estimate whether the thesis results could be deployed in practice; alternatively, evaluate whether the results of the FT extend the already published/known results or whether they bring in completely new findings.

Comments:

I'm quite disappointed with the results. Based on the beginning on the thesis and the apparent knowledge of the student, I had hoped that it could be a material that could be presented at a conference, but the result of the work which should have researched the alternate network layers mostly contains the theory that should have been taken as granted - the first paragraph of the assignment text. But the methodology is sound and, if completed, it could still make an insteresting conference entry.

Evaluation criterion:	*The evaluation scale: 1 to 5.*
5. Activity and self-reliance of the student	*5a:* *1 = excellent activity,* *2 = very good activity,* *3 = average activity,* *4 = weaker, but still sufficient activity,* ***5 = insufficient activity*** *5b:* *1 = excellent self-reliance,* ***2 = very good self-reliance,*** *3 = average self-reliance,* *4 = weaker, but still sufficient self-reliance,* *5 = insufficient self-reliance.*

Criteria description:
From your experience with the course of the work on the thesis and its outcome, review the student's activity while working on the thesis, his/her punctuality when meeting the deadlines and whether he/she consulted you as he/she went along and also, whether he/she was well prepared for these consultations (5a). Assess the student's ability to develop independent creative work (5b).

Comments:

There used to be a grading category in this review template called Complexity of the assignment. I would say there, that this was one of the most complex assignments I had in store. However, I had warned the student at the beginning that it will require to do work during the one semester that should be used to prepare the theory. She did not heed the advice. Pehaps because of working full time or because of other life issues which I don't know the details of, she has not done work before the start of the semester of the Thesis subject. She has not done work during that semester either and extended the assignment for one more semester. She has started writing at the end of December, but there was minimal activity during the exam period. We started a very active e-mail conversation after 9.3. which is when I have provided 2 physical servers with dual 10 Gb/s network cards for testing. A full rack was available upon request. I believe that actual measurement has started about 2 weeks before the deadline.

Evaluation criterion:	*The evaluation scale: 0 to 100 points (grade A to F).*
6. The overall evaluation	*60 (D)*

Criteria description:
Summarize which of the aspects of the FT affected your grading process the most. The overall grade does not need to be an arithmetic mean (or other value) calculated from the evaluation in the previous criteria. Generally, a well-fulfilled assignment is assessed by grade A.

Comments:

I am quite ambivalent about the thesis and its author. I felt she is very knowledgeable about the topic even when I agreed to lead the thesis. During the writing of this thesis, she probably learned even more. But in this state, I must say that this it is just the first part and the second is missing. It could use the two semesters' time as I warned in advance. But this first part is quite comprehensive and could serve as good orientation material for readers. The topic was also very complex. Lastly, I believe her that she would like to continue working on it to present it on a conference. Having said that, I give a passing, albeit not very good, grade.

Signature of the supervisor: