CS443 / Final Exam / 2019-2020, Spring

Due: 2020-06-12 11:30AM (GMT+3)

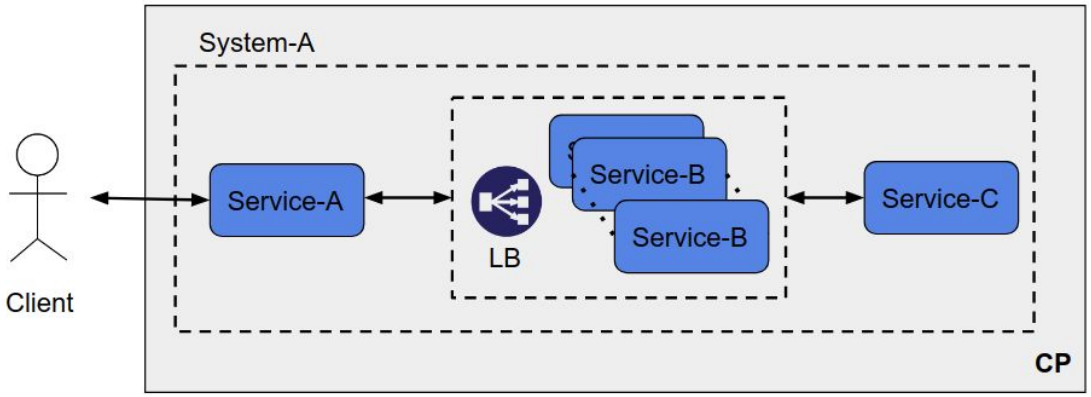
Computer Engineering Dpt.
Bilkent University

Full Name :
Student ID # :
Date :

Instructions

- Add date, your full name & ID number and include this exam page in your exam.
- Plagiarism and/or copying solutions is strictly forbidden. Answer all questions by yourself. If you receive help from anyone in and/or outside the class, explicitly state that you have, and identify the person or source from where you have received this help.
- The points for solutions that have been shared (copied) among a group of students (i.e. identical solutions/answers) will be equally divided among them under the best of circumstances.
- Submit your answers in pdf format to Mr. Mousa Farshkar Azari at mousa.farshkar@bilkent.edu.tr
- Do not use the "write down + take a picture + submit" method. Use the "type down + export + submit" method. Although you are allowed to draw diagrams by hand (and import into your document), it is not very convenient (for both sides).
- Do not submit rotated or upside down, tiny images. All pages must be contained in a single pdf file (not archived folders like a zip file). Make sure that your print size is legible and not small.
- Answers should be clear, concise, and precise. Please, try not to exceed 4-5 pages in total (including the questions & this exam page).
- Use your “<last name>_<first name>” to name your pdf file. Example: doe_john.pdf, sonat_orcun.pdf, akyol_gaye_su.pdf, etc.
- Hardcopy submissions shall not be accepted for grading.
- All submissions must be made by **2020-06-12 11:30AM (GMT+3)**.
- Late submissions shall be subject to surcharge of negative points. If you submit your exam within 2 hours of the submission deadline, you will lose 5 points. Another 5 points will be deducted from your total score for each additional 2 hours of late submission.

Questions



- System-A works on a hypothetical container platform (a PaaS) called “CP” and cloud service provider (CSP) states that its availability is 3-nines for its all services (scaling like creating a new container instance, load balancing, etc.) and containers.
- In CP, containers (all have fixed standard computational resources) are billed by their up time individually.
- System-A is composed of 3 services (each service runs on its own separate container) and all of them take part (sequentially called once for each request) to complete response successfully.
- Service-A and Service-C container instances are static (always up, single instances). System-A dynamically scales in/out only for Service-B and it uses services of CP in order to handle that “scale in/out” operations. CP also provides a load balancing service for Service-B.
- Assume 10% of all client requests require “scaling out” for Service-B (the rest of the requests do not require/include creating a new container and CP handles “scale in” automatically by stimuli).
- Assume all other undefined (e.g. underlying/external infra. systems, storage, etc.) availability values are 100%.

Q.1. (20 Pts) What is the availability of System-A?

Q.2. (20 Pts) What is the most important effect of “CP’s scale-in service availability” over System-A?

Q.3. (30 Pts) Assume that you are trying to design a solution handle varying loads and **cloud-bursting** and **serverless** are two candidate technologies to adapt into your solution. Discuss your decision process and list the **three** most important/differentiator features of cloud-bursting and serverless.

Q.4. (30 pts) Considering your project in CS443, assume the requirements are changed and the updated version is able to get the snapshots of the target URL contents (pages, media, etc. a couple of GBs for even one URL is possible). You are asked to update your solution with this snapshot feature. How would you update your design? Please give the contrast very explicitly.