

# 6.033 Spring 2016

## DP Final Report Assignment

Due 5/6 at 5:00pm

Having now had two rounds of feedback on your design, it's time to write your final report. Unlike the proposal document, the report should contain enough detail that it could feasibly be turned over to IS&T for implementation. It should also contain an evaluation of your design.

## Outline of the Report

Your team's report should be approximately 5000 words<sup>1</sup> and follow the basic outline below:

- **Title page:** Give your report a title that reflects the subject and scope of your project. Include your names, email address, recitation instructor, section time(s), and the date on the title page.
- **Introduction:** Summarize the problem to be solved and what your design is intended to achieve. Outline your design and briefly outline why your design meets the requirements.
- **Design:** Explain your design. Identify your design's main components and protocols. You should subdivide the design, with corresponding subsections in the text, so that the reader can focus on and understand one piece at a time. Explain why your design makes sense as well as explaining how it works. Use diagrams, pseudo-code, and worked examples as appropriate.

It should be clear from this section that your design meets the specifications of the assignment (e.g., that it does not exceed the storage nor the processing power of the APs, etc.). Leave any major calculations to the evaluation section, though it's fine to reference those calculations beforehand (e.g., "Our design results in a communication overhead of fewer than 1Kbit/sec; see Section 3.1 for an analysis.").

- **Evaluation:** Evaluate your design. There are more details about this section below.
- **Conclusion:** Briefly summarize your design and provide recommendations for further actions and a list of any problems that must be resolved before the design can be implemented.
- **Acknowledgments and references:** Give credit to individuals whom you consulted in developing your design. Provide a list of references if appropriate.

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<sup>1</sup> As always, use this word count as a guideline. If you are writing significantly more than 5000 words, you're giving us too much detail. If you are writing significantly fewer than 5000 words, you are giving us too little. We care much more about the content of your paper than the exact word count.

# Evaluation

A good evaluation will do more than just calculate metrics relevant to your system; it will also use calculations to justify design decisions. For example, “Our algorithm for connecting clients results in an initial connection time of only 10 msec, compared to a design without this algorithm, which results in a connection time of 3 seconds.”

At a minimum, your evaluation section should address the following questions:

- **What is the communication overhead of your system?**

Typically this will be a measure of the amount of control traffic sent between clients and APs.

- **On average, how long will it take a new client to connect to an acceptable AP?**

Consider multiple scenarios, including one where many clients are trying to connect at once. If you can't calculate this value precisely in all scenarios, give a reasonable range based on your estimates.

- **On average, how long does it take data collected at an AP to be transferred to the IS&T server?**

We've given you the requirement that APs collect data about clients every second, and eventually transfer that data to IS&T. After collecting data for time  $T$ , how long do you expect it to take before IS&T has that data?

- **What parts of your system limit scale, and what are those limits?**

Could your system handle IS&T adding another 1000 APs to the system? Could it handle an influx of users? For example, Kresge Auditorium seats 1226 people; in your system, how will an AP in Kresge behave when the room is full?

- **How well does your system utilize the network, and what trade-offs did you make to improve (or hurt) utilization?**

You will (most likely) not be able to calculate utilization exactly, but you can still reason about it. What is the worst case for network utilization in your system? Did you trade off any other aspects of your system to improve utilization? Alternatively, did you trade off utilization to improve other aspects of your system? What are the results of your tradeoff?

Two common tradeoffs for utilization are user happiness — allowing users to be unhappier to improve utilization — and client reshuffling — shuffling clients around (which disrupts their network connection) to improve utilization. Regardless of which side of these tradeoffs that your design falls on, you should explicitly evaluate them. Tell us how frequently you expect users to be unhappy and to be shuffled around, and how much you expect utilization to improve or suffer as a result.

In answering those questions, you should provide the appropriate numbers as well as some context for them. How do the values that you calculated affect users or other entities in the system? If clients are able to connect within  $X$  seconds, is that good or bad? Did you make any trade-offs that involve these metrics? Etc.

Because every system design is different, you may need to discuss additional metrics specific to your system in the evaluation. You may also discuss how your system will evolve as IS&T upgrades their hardware. What would an increase in server or AP specs (storage/CPU/memory) mean for your system? Or an upgrade to a future version of 802.033?

Your evaluation should also address the use-cases presented in the design project write-up. You may pull those out into their own subsection, or mention them at different points within your evaluation. Whatever structure works best for your report is fine.

Finally, some design decisions may not correspond to calculable metrics; the most common case is preferring a simple, modular design over a complex one. Your design report should note when you made choices in the name of simplicity or other design principles. Depending on your report organization, it may be more appropriate to include this information in the design section than in the evaluation.

## Cover Memo

In addition to the report, **each student** should provide a cover memo of approximately 250 words. The format should be the same as the memo you wrote for the [DP proposal](#).

The memo should briefly summarize the contribution of each team member and reflect on the writer's own contribution. Please answer the following questions:

- What is the biggest change your team has made to your design since the proposal?
- Which model(s) of collaboration did your team use to develop your design and write this report?
- Was your model of collaboration effective for your team? Describe any changes you made to your collaboration process between the proposal and the report.