

# Homework 4: Introduction

*Due: 11:59 PM, Dec 11, 2014*

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## 1 Credit

This homework is extra credit, and will be worth 3% of your final grade.

## 2 End-to-End

Please re-read *End-to-End Arguments in System Design*.

Please answer the following questions:

1. Going back to Homework 0, how has your understanding of the End-to-End argument changed?
2. One important question when thinking about the End-to-End argument is what the ends are. For each example below, answer these three questions:
  - What are the ends in the example?
  - What are redundant functionalities implemented in lower layers to improve performance?
  - What are checks that are not done in lower layers because they have to be done in the upper layers?

Write just one short sentence per question per item below. You may answer “none” if appropriate.

- (a) BitTorrent (focus on file integrity)
- (b) TCP (focus on reliability)
- (c) TCP over lossy wireless links
- (d) HTTPS (focus on security)
- (e) A FedEx package left outside your door
- (f) Checked luggage on a flight
- (g) An example of your own choosing not already on the list
- (h) Another example of your own choosing not already on the list

3. Give one example of a system that violates the End-to-End principle and any shortcomings this introduces. Do not use the same example you used on Homework 0.
4. How does the End-to-End argument apply to SDNs (Software Defined Networks)? In what ways do SDNs embody the End-to-End argument, and in what ways do they fail to embody it? Does the End-to-End argument even make sense in the context of SDNs? Why or why not?

### 3 Handin

Your homework should be handed in as a single PDF file by typing

```
cs168_handin hw4
```

from a directory containing your handin. Remember that everything in this directory will be submitted, so keep it clean! We don't want to have to sift through the clutter to find your homework.

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Please let us know if you find any mistakes, inconsistencies, or confusing language in this or any other CS168 document by filling out the anonymous feedback form:

<http://cs.brown.edu/courses/cs168/f14/feedback.html>.