CAD Submission and Grading

EE 47X | University of Washington

1 Overview

Students will submit a set of files for each CAD that contains all of the information required to evaluate their design. The files that students will submit include netlists, lab reports, LVS/DRC reports, and more. To facilitate objective grading, and to avoid potential ambiguity in terms of what is required for each assignment, each CAD is accompanied by a file named `specifications.json`, that contains the precise description of what is required for the CAD submission. Once students have submitted their assignments, they will be graded on correctness and quality, which are described in more detail below.

2 CAD Submission Specifications

The `specifications.json` is essentially a nested object of key-value pairs (a.k.a., dictionary or map), that contains the locations and names of files, circuits, and more. JSON is a standard, well documented data format that students can quickly read about online[1]. There are also formatters available to make JSON data more readable, and help locate syntax errors[2]. Consider the following specifications file that accompanies the toy circuit in Figure 1:

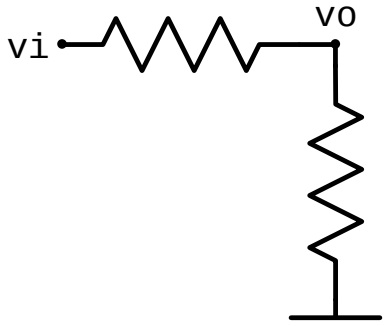

Figure 1

[1] A 1-minute JSON example: http://www.w3schools.com/json/

[2] One instance of an online JSON formatter: http://www.jsoneditoronline.org/

Listing 1: `specifications.json` for a toy circuit

```
{
  "parts": {
    // Part 1
    "1": {
      "files": {
        "cadx_turnin/part1/voltage_divider.ckt" : {
         // The specific circuit, and its interface
         "circuit": {
            "name": "voltage_divider",
            "pins": ["vi", "vo"]
          }
        }
      },
      "measurements": {
        "output_voltage": "",
        "rise_time": ""
      }
    },
    // Part 2
    "2": {
      "files": {"none": "none"},
      "measurements": {"none": "none"}
    }
  },
  "report": "cadx_turnin/cadx_report.pdf"
}
```

The file above accompanies a CAD with 2 parts, the second of which requires no files or measurements. The first part requires a single netlist named `voltage_divider.ckt`, located in the directory `cadx_turnin/part1/`. Furthermore, the file `voltage_divider.ckt` should contain the circuit design named `voltage_divider`, with the pins `vi` and `vo`. Part 1 also has several measurements, `output_voltage` and `rise_time` that should be filled in by the student before submission.

One particular detail for syntax correctness is that all measurement values should be reported in double quotes, regardless of whether values are in scientific notation (which is supported) or not. For example, `"rise_time":0.000123` is not a valid value, but `"rise_time":"0.000123"` is valid. `"rise_time":"1.23e-4"` is also valid.

On a final note, comments (denoted by "//") are not officially JSON compliant, but the `specifications.json` files typically contain comments for the sake of readability. Students are free to submit their files with comments, but they will need to be deleted for use with any JSON formatters or editors.

2.1 Submission Directory Structure

For each CAD, students will submit a zipped folder containing their filled-out `specifications.json` file, and a directory named `cad<num>_turnin` (Figure 2). Hence, the paths and files to be submitted are relative only to the specifications file. This ensures that the grading system functions correctly, and enables the use of scripts to verify that no files or submission items are accidentally forgotten.

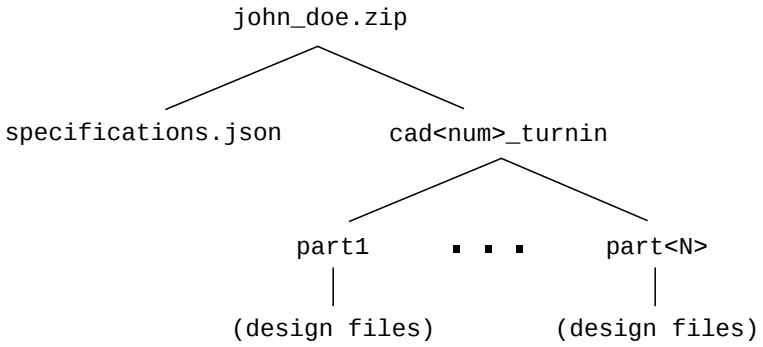

Figure 2: The directory structure for CAD submissions

3 CAD Reports

Reports for CAD's are only needed when students are asked to submit plots, or short answer questions. Students are free to choose the organization and style of the report, so long as answers are clearly numbered, and plots or figures are labeled and easily readable (whatever that means).

4 CAD Grading: Correctness and Quality

The exact details of the grading criteria vary on per-CAD basis, but in general the grading for each CAD is composed of a *correctness* component, and a *quality* component. Of the final CAD grade, correctness counts for roughly 60%, and quality 40%. The correctness component is typically divided into portions for functional correctness (i.e., the circuit performs the operations it was designed to do), and a portion for correct analysis (e.g., measurements).

The quality component has more variation between CAD's (since the expectations for design quality increase as the course progresses), but in general it encompasses design performance and layout quality. The design performance criteria may entail area, energy dissipation, delay, or some combination of the three.