Typst for CS240

Contents

1. Introduction

The raison d'etre of this document is to help its readers save time that would otherwise have been spent searching for answers on the internet or troubleshooting their own .typ files while working on CS240.

This document is intended for 2 types of readers:

1. People who are new to Typst and wish to learn how to use it.
2. Existing Typst users.

1.1. For New Typst Users

For both types of readers, this document will act as a resource showing how to effectively format homework assignments and draw relevant data structures for CS240.

For those of you that fall into the first camp of readers, those unfamiliar with Typst, here is a brief explanation of what Typst is from the official documentation:

> Typst is a new markup-based typesetting system for the sciences. It is designed to be an alternative both to advanced tools like LaTeX and simpler tools like Word and Google Docs. Our goal with Typst is to build a typesetting tool that is highly capable and a pleasure to use.
>
> — Typst Docs

To familiarize yourselves with Typst I would suggest you read the official Typst tutorial. You won't need to read the whole thing, however this document assumes you know the basics of using Typst. You should be comfortable with the following before continuing:

1. How you will use Typst. Typst has an excellent online editor as well as a CLI. Which will you use?
2. Basic syntax.
3. Using math mode.
4. Simple formatting.
5. Using external packages.

Once you are familiar with Typst and comfortable using it, you will be able to make the most of this guide as it will show you how you can use Typst to succeed in CS240.

2. Pseudocode

For writing pseudocode, I recommend using the algo package. Here is a basic example of using algo from the package's documentation:

```
#import "@preview/algo:0.3.3": *
#algo(
  title: "Fib",
  parameters: ("n",)
)[
  if $n < 0$:#i\          // use #i to indent the following lines
    return null#d\        // use #d to dedent the following lines
  if $n = 0$ or $n = 1$:#i #comment[you can also]\
    return $n$#d #comment[add comments!]\
  return #smallcaps("Fib")$(n-1) +$ #smallcaps("Fib")$(n-2)$
  ]
```

The output from the code will look like this:

FIB(n):

```
1  if n < 0:
2      return null
3  if n = 0 or n = 1:                  // you can also
4      return n                        // add comments!
5  return FIB(n − 1) + FIB(n − 2)
```

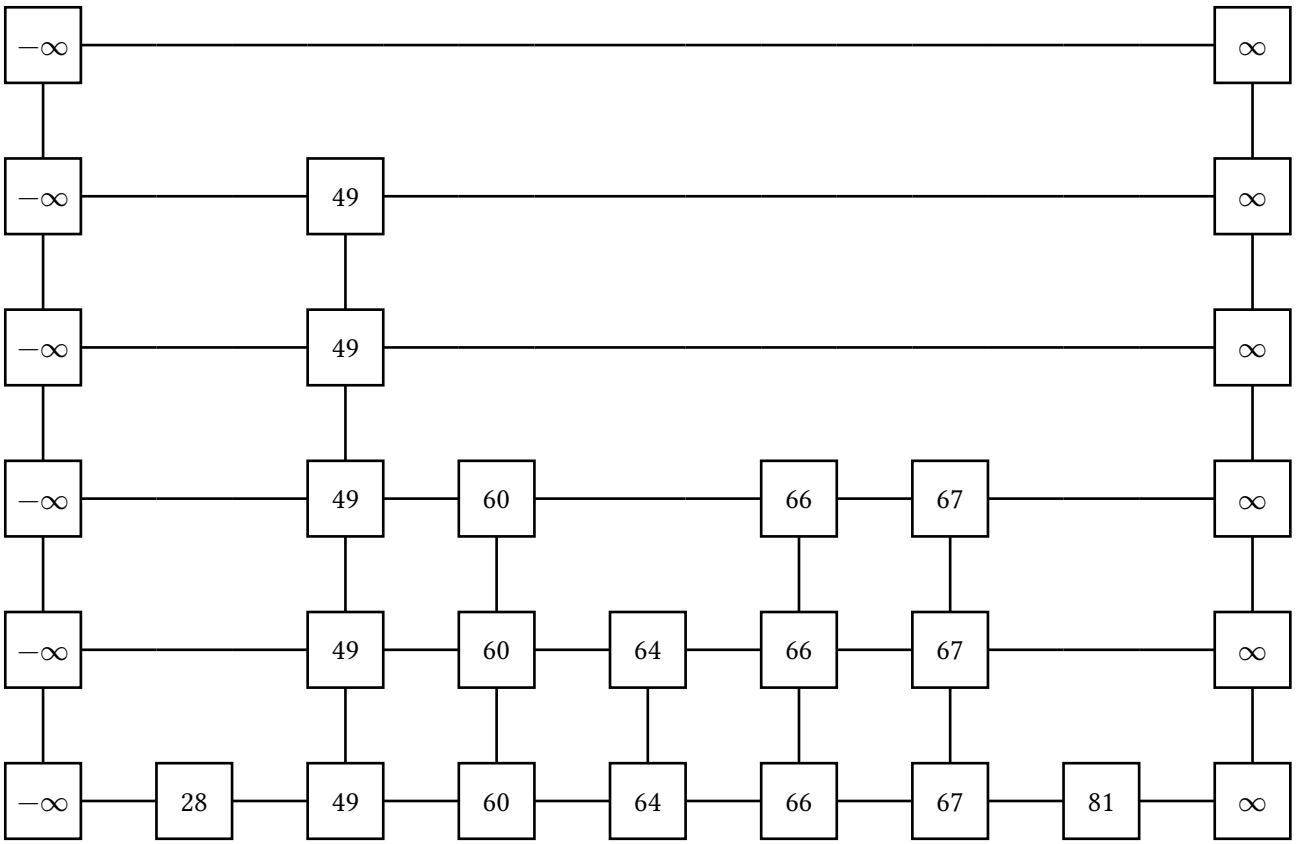
3. Trees

4. Skiplists

The following is a function to automatically draw skip lists from an array of values using the **cetz** package:

```
#import "@preview/cetz:0.2.2": *
#let skiplist(values) = {
  canvas({
      import draw: *
      let h = values.map(val => val.last()).sorted().last() + 1
      let l = values.len() + 1
      // Create sentries
      for i in range(0, h - 1) {
        rect((0, 2 * i), (rel: (1, 1)))
        content((0.5, 2*i + 0.5), [$- infinity$])
        line((0.5, 2 * i + 1), (0.5, 2 * (i + 1)))
        rect((2 * l, 2 * i), (rel: (1, 1)))
        content((2 * l + 0.5, 2*i + 0.5), [$infinity$])
        line((2 * l + 0.5, 2 * i + 1), (2 * l + 0.5, 2 * (i + 1)))
      }
      // Add top level
      rect((0, 2 * (h - 1)), (rel: (1, 1)))
      content((0.5, 2*(h - 1) + 0.5), [$- infinity$])
      rect((2 * l, 2 * (h - 1)), (rel: (1, 1)))
      content((2 * l + 0.5, 2*(h - 1) + 0.5), [$infinity$])
      // Add remaining nodes
      for (index, (val, height)) in values.enumerate(){
        for i in range(1, h){
          if i < height {
            rect((2 * (index + 1), 2 * i), (rel:(1, 1)))
            content((2 * (index + 1) + 0.5, 2 * i + 0.5), [#val])
            line((2 * (index + 1) + 0.5, 2 * i - 1), (2 * (index + 1) + 0.5, 2 * i))
          } else {
            line((2 * (index + 1), 2 * i + 0.5), (rel: (1, 0)))
          }
        }
        rect((2 * (index + 1), 0), (rel: (1, 1)))
        content((2 * (index + 1) + 0.5, 0.5), [#val])
      }
      for i in range(0, l){
        for j in range(0, h){
          line((2 * i + 1, 2 * j + 0.5), (rel: (1, 0)))
        }
      }
    })
}
#let values = ((28, 1), (49, 5), (60, 3), (64, 2), (66, 3), (67, 3), (81, 1))
#skiplist(values)
```

The output from the code will look like this:


−∞ ∞
−∞ 49 ∞
−∞ 49 ∞
−∞ 49 60 66 67 ∞
−∞ 49 60 64 66 67 ∞
−∞ 28 49 60 64 66 67 81 ∞

5. Contribution

Contributions and feedback are welcomed and encouraged as to serve its purpose this guide must evolve alongside the CS240 curriculum and the Typst project. You can contribute and report issues via Github.