PIPELINE
LANGUAGE RESOURCE MANUAL

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Async control flow is incredibly useful when dealing with I/O operations, which are the foundation of web-based programming. When restricted to a single-threaded and single-process model, I/O operations in a programming language are blocking and a program can wait for an unbounded time. Introduce multi-threading or multi-process models, and a programming language becomes much more complex. The single-threaded asynchronous control flow model simplifies dealing with I/O operations such that the program does not halt because of them.

7.1 My First Pipeline

Consider the following example pipeline:

```
readFile('/home/user/you/data.txt')
| processData(_)
| saveProcessedData(_, '/home/user/you/processedData.txt')
```

Formally, the definition of a pipeline is as such:

```
function0(Type param0, ..., Type paramN) |
function1(_, Type param0, ..., Type paramN) |
function2(_, Type param0, ..., Type paramN) | ... |
functionN(_, Type param0, ..., Type paramN)
```

How to interpret the above: "Type" references some actual type "Type param1, ..., Type paramN" references some (potentially zero-length) sequence of parameters to a function "_" acts as a placeholder for whatever value will be provided by the function one to the left in the pipeline

> Note that:
> The first function in the pipeline, function0, has no placeholder "_" because it has no function one to the left from which to take a value. The sequence of parameters can be of any finite length, including zero.

7.2 And Then There Were Two

Consider the terms "pipelineX" to refer to a sequence of functions arranged in a pipeline as detailed in the section "My First Pipeline," where X is a number serving as a unique ID for the pipeline. Now consider the two distinct pipelines, "pipeline0" and "pipeline1." Both pipelines contain functions which are blocking, waiting for the results of an I/O operation. The two pipelines are arranged as such in code:

```
pipeline0;
```

```
pipeline1;
```

Let's mimic the flow of a real program as it executes the two lines above. "Pipeline0" is executed and runs until there is a blocking operation. As soon as a blocking operation is encountered, the program moves it off to a worker thread, and then on the main thread continues on to execute "pipeline1."

Now we have a handful of different cases to consider.

7.3 Brief Summary of the Architecture?

Functions in a pipeline do not return. Rather, an entire pipeline may be thought of a series of nested functions, where what might be mistaken for the return value is simply passed as a parameter to the next nested function, and so on.

Therefore, if there is data you wish to manipulate or use after a function yields it, this manipulation/use should be done within the same pipeline.

The same state is kept throughout an entire pipeline

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Chapter 8

Tools for Web Developement

Pipeline is a language designed for backend web development. As such, there are certain tools necessary for the backend web programmer.

8.1 Comprehensive List of Tools for Web Development

8.1.1 subsection

subsubsection

Appendix A

The Pipe Directive