

Temperature Processing System Design and Implementation

Stephen Ye

Data Structure Design

Temperature Storage

- Temperatures are stored in a simple list structure (`temperatures`)
- Each temperature is stored as a Fahrenheit value with floating-point precision
- List is appended to maintain order of input
- Implemented using Racket's built-in list functionality

Function Storage

- Functions are stored in an association list (`function-table`)
- Each entry contains a key: Function name as a string and a value: Pair of function procedure and original function body string
- Current post-processing function stored separately in `current-postproc`

Input Processing

1. Main Input Loop

- Reads input line by line using `read-line`
- Each line is trimmed and pattern-matched against command patterns
- Invalid input is silently discarded

2. Temperature Parsing

- Regular expressions used to match different input formats
- Supports:
 - Direct Fahrenheit values
 - Celsius values c/C prefix
 - Kelvin values k/K prefix
 - Fahrenheit values f/F prefix
- All values converted to Fahrenheit before storage
- Invalid values (below absolute zero) are discarded

3. Command Processing

- Commands recognized by initial character:
 - e/E: End and display results
 - p/P: Define post-processing function
 - s/S: Store function
 - r/R: Retrieve function
 - i/I: Clear current function
 - dl/dc/pl/pc/pd: Editing commands

Data Structure Manipulation

Temperature Updates

- New temperatures appended to list using `append`
- Post-processing function if present applied before storage
- Clearing performed by setting list to empty

Function Updates

- Functions stored with unique names
- Function deletion filters the association list
- Function clearing resets table to empty
- Current function updates handled using `current-postproc`

Data Display

1. Temperature Display

- Shows count of stored samples
- Lists all temperatures
- Calculates and shows average
- Special handling for empty list

2. Function Display

- Shows count of stored functions
- Lists functions sorted by name
- Displays both name and function definition
- Special handling for empty table