The project is a weather data analysis application that calculates the average temperature difference for various weather stations. The application reads data from a file and calculates the statistics using both a List and a TreeMap. Both approaches work correctly, and the main method prints the results and time taken by each approach.

Since the data file is large, I tested the program using a smaller dataset first, which was hardcoded into the application. Once the program was working correctly, I moved on to using the actual large data file. And provided run time for each method

Timing data and benefits/drawbacks:

The List approach took 20 milliseconds, while the TreeMap approach took 10 milliseconds. The List approach provides faster insertion and a more straightforward implementation, but searching and updating can be slower, especially for large datasets. On the other hand, TreeMap offers better search and update performance due to its sorted nature, but its insertion time is generally slower than a List.

I learned about the importance of choosing the appropriate data structure for specific tasks, as it can significantly impact the performance of an application.

I enjoyed working on this project because it provided an opportunity to work with real-world weather data and explore the benefits and drawbacks of using different data structures.

One area of confusion was determining the best way to handle the large dataset and optimize performance. It would be helpful to have more guidance on how to efficiently work with large datasets and best practices for handling them.

If I had more time, I would explore additional performance optimizations and consider implementing more weather statistics. Additionally, I would improve the user experience by providing a more interactive interface for users to select the desired statistic or input their data.

Output of the code was too long to screenshot, hence just copy pasting it here, apologies.:

Starting simulation

List based computation results:

Alabama: 21.933962264150942

Alaska: 12.7423239012643

Arizona: 29.943396226415093

Arkansas: 20.566037735849058

California: 21.78878878878879

Colorado: 31.037735849056602

Connecticut: 18.556603773584907

Delaware: 18.81132075471698

Florida: 17.04874213836478

Georgia: 22.940251572327043

Hawaii: 13.58867924528302

Idaho: 23.67924528301887

Illinois: 18.336477987421382

Indiana: 18.86320754716981

Iowa: 19.241509433962264

Kansas: 25.21383647798742

Kentucky: 19.633962264150945

Louisiana: 19.386973180076627

Maine: 19.82389937106918

Maryland: 19.641509433962263

Massachusetts: 12.171052631578947

Michigan: 18.22012578616352

Minnesota: 18.52075471698113

Mississippi: 22.17789757412399

Missouri: 20.38814016172507

Montana: 24.893653516295025

Nebraska: 25.95754716981132

Nevada: 29.264150943396228

New Hampshire: 13.76

New Jersey: 18.330188679245282

New Mexico: 28.51572327044025

New York: 17.94811320754717

North Carolina: 19.7277628032345

North Dakota: 22.962264150943398

Ohio: 18.82210242587601

Oklahoma: 24.25943396226415

Oregon: 22.71698113207547

Pennsylvania: 18.77088948787062

Puerto Rico: 10.943396226415095

Rhode Island: 18.37735849056604

South Carolina: 21.816037735849058

South Dakota: 24.245283018867923

Tennessee: 21.552380952380954

Texas: 21.833333333333332

Utah: 21.30188679245283

VA: 19.88679245283019

Vermont: 18.169811320754718

Virginia: 18.39308176100629

Washington: 20.142857142857142

West Virginia: 21.07547169811321

Wisconsin: 17.34433962264151

Wyoming: 27.50943396226415

Time taken by computeByList: 20 milliseconds

TreeMap based computation results:

Alabama: 21.933962264150942

Alaska: 12.7423239012643

Arizona: 29.943396226415093

Arkansas: 20.566037735849058

California: 21.78878878878879

Colorado: 31.037735849056602

Connecticut: 18.556603773584907

Delaware: 18.81132075471698

Florida: 17.04874213836478

Georgia: 22.940251572327043

Hawaii: 13.58867924528302

Idaho: 23.67924528301887

Illinois: 18.336477987421382

Indiana: 18.86320754716981

Iowa: 19.241509433962264

Kansas: 25.21383647798742

Kentucky: 19.633962264150945

Louisiana: 19.386973180076627

Maine: 19.82389937106918

Maryland: 19.641509433962263

Massachusetts: 12.171052631578947

Michigan: 18.22012578616352

Minnesota: 18.52075471698113

Mississippi: 22.17789757412399

Missouri: 20.38814016172507

Montana: 24.893653516295025

Nebraska: 25.95754716981132

Nevada: 29.264150943396228

New Hampshire: 13.76

New Jersey: 18.330188679245282

New Mexico: 28.51572327044025

New York: 17.94811320754717

North Carolina: 19.7277628032345

North Dakota: 22.962264150943398

Ohio: 18.82210242587601

Oklahoma: 24.25943396226415

Oregon: 22.71698113207547

Pennsylvania: 18.77088948787062

Puerto Rico: 10.943396226415095

Rhode Island: 18.37735849056604

South Carolina: 21.816037735849058

South Dakota: 24.245283018867923

Tennessee: 21.552380952380954

Texas: 21.833333333333332

Utah: 21.30188679245283

VA: 19.88679245283019

Vermont: 18.169811320754718

Virginia: 18.39308176100629

Washington: 20.142857142857142

West Virginia: 21.07547169811321

Wisconsin: 17.34433962264151

Wyoming: 27.50943396226415

Time taken by computeByTree: 10 milliseconds

Finished simulation