

# Group 23

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# Projects Summary

# Project #1 - Joinery

Link:

<https://github.com/cardillo/joinery>

Description:

A data frame implementation in the spirit of Pandas or R data frames.

Slightly more detail:

In Java, a data analysis library for joining together pieces of data to produce insight.

# Project #2 - JBot

Link:

<https://github.com/rampatra/jbot>

Description:

JBot makes Slack and Facebook bots in minutes.

Slightly more detail:

Java framework that is open source tool to build bots and custom integrations and provides functionality to make the bot live right away

# Timeline

Project Name	Issues Implemented	Student netID(s)	Lines changed	Date Started	Date Completed
Joinery	51	rfraser3, pkatre2	+24, 0	Week 5	Week 8
	75	pkatre2	+9, 0	Week 4	Week 7
	83	mmunjal2	+19, -2	Week 4	Week 7
	63	rfraser3, pkatre2	0, 0	Week 5	Week 8
	38	mmunjal2, pkatre2	0, 0	Week 5	Week 7
	93	eshiafr2, mmunjal2	+56, -2	Week 5	Week 8
Jbot	197	malara2	+170, -17	Week 5	Week 7
	114	malara2	+3, -3	Week 3	Week 3
	171	eshiafr2	+4, -1	Week 4	Week 8
	172	vdadi2	+94, -8	Week 5	Week 7
	<a href="#">28</a>	vdadi2	+229, -5	Week 3	Week 5
Alexa	N/A	Malara2 eshiafr2	Attempted Build Aws implementatio n	Week 3	N/A
Bumptech Glide	N/A	malara2	Attempted Build	Week 4	N/A

# Timeline evidence



pkatre2 commented on Oct 23

can you assign it to me , would like to contribute

nilesh981 / jbot Public  
forked from rampatra/jbot

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master

Commits on Nov 22, 2021

- Added the test cases for excel data read and file share capabilities.  
nilesh981 committed 18 days ago
- Updating the file sharing capabilities  
nilesh981 committed 18 days ago

Commits ·  
[nilesh981/jbot](https://github.com/nilesh981/jbot)  
([github.com](https://github.com))

```
"deployments_url": "https://api.github.com/repos/eshiafr2/jbot/deployments",  
"created_at": "2021-11-21T18:45:16Z",
```

Commits on Dec 7, 2021

**Test for issue 171**  
eshia committed 2 days ago

<https://github.com/eshiafr2/jbot>

cardillo / joinery Public

Code Issues 29 Pull requests 13 Actions Projects

**Unable to compile in IntelliJ #97**  
Open rfraser3 opened this issue 22 days ago · 3 comments

\* We worked in our local machine , and did git commit at the end after build was successful.

# Timeline evidence

Commits on Nov 21, 2021

<b>Update DataFrame.java</b> pkatre2 committed 18 days ago	Verified		75eb71e	
<b>Update DataFrameSortByTest.java</b> pkatre2 committed 18 days ago	Verified		3bdec07	
<b>Update DataFrame.java</b> pkatre2 committed 18 days ago	Verified		76c11f9	
<b>Update Sorting.java</b> pkatre2 committed 18 days ago	Verified		16986a2	



<https://github.com/pkatre2/joinery>

add-time-valid...

Commits on Dec 9, 2021

<b>add facebook tests and javadoc</b> Mistermo716 committed 2 hours ago		5c4ad3b	
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Commits on Nov 21, 2021

<b>add java doc to tests</b> Mistermo716 committed 18 days ago		ae0ca4e	
<b>fix invalid time for meeting bug</b> Mistermo716 committed 18 days ago		46b3be6	



<https://github.com/Mistermo716/jbot/tree/add-time-validation>

Commits on Nov 21, 2021

<b>Updating javadoc for added function</b> Mohit Munjal authored and Mohit Munjal committed 18 days ago		b982ef7	
<b>Final Commit</b> Mohit Munjal authored and Mohit Munjal committed 18 days ago		a2d0897	



<https://github.com/mmunjal/joinery>

\* We worked in our local machine , and did git commit at the end after build was successful.

Issues



# Joinery: Issue #38

URL: <https://github.com/cardillo/joinery/issues/38>

NetIDs: Mmunjal2, pkatre2

**Feature:** interrupt in the shell should stop the currently running statement

## Implementation:

By design of kernel, ctrl+c always interrupts the program. To achieve this, we had to use different ctrl commands. We implemented for ctrl+O, by pressing this it will interrupt the currently running execution in the shell. For implementation, we handle using trap function, once this key is pressed it will halt and kill the currently running PID.

## Tests added:

JUnit - 1) Run the Shell 2) Load the csv file into DataFrame, enter control+O 3) Operation Should not exit the shell 4) Should only interrupt the current operation.

## Difficulties encountered:

had to learn multithreading Java Programming.

# Joinery: Issue #51

URL: <https://github.com/cardillo/joinery/issues/51>

NetIDs: rfraser3, pkatre2

**Issue:** Export to CSV does not write row names (the index is always dropped)

**Root cause:** Per Joinery's creator, "writing the index is not supported by the CSV library Joinery uses"

**Solution:** Add duplicate index column to DataFrame before writing CSV to preserve 1 index after writing CSV

## Implementation:

- Loop over the DataFrame's index and add each element to an Object list

- Use that list to create a 1-column DataFrame

- Left-join the 1-column DataFrame and the original DataFrame

## Tests added:

- JUnit: assert that the original DataFrame's Column[0] is now the new Column[1]

- JUnit: updated existing test to no longer assume bug is present

## Difficulties encountered:

- Pre-existing functions in Joinery have slightly different behavior based on JDK and package versions

- Existing index datatypes make casting to a DataFrame difficult

- Existing tests assume bug is present

# Joinery: Issue #63

URL: <https://github.com/cardillo/joinery/issues/63>

NetIDs: rfraser3, pkatre2

**Issue:** Enable option to disable default date formatting

**Root Cause:** original developer forgot to include this option

**Solution:** this seemed straightforward

**Implementation:**

Implemented Flag based approach to disable or enable date formatting.

**Tests:**

Enable the option to disable date time format through Shell. 2) create data frame with multiple time formats . 3) Export data into a csv. 4) csv should have all time formats.

**Difficulties encountered:**

This one was fairly straightforward.

# Joinery: Issue #75

URL: <https://github.com/cardillo/joinery/issues/75>

NetIDs: pkatre2, mmunjai2

**Feature:** sort by index

**Implementation:**

Loop over the DataFrame's index ,compare values and finally append back in sorted order.

**Tests added:**

- JUnit - a) create data frame with multiple columns
- b) perform sorting on index of DataFrame
- c) dataframe should be sorted on index.

**Difficulties encountered:**

Joinery Project was not compiling in local , had so many challenges . Finally worked in VM.

# Joinery: Issue #83

**NetIDs:** mmunjal2,pkatre2

**Feature:** Concatenate two dataframes on same columns

**Importance :** This issue is important since it allows data manipulation through integration of multiple dataframes. This extensibility improves the capabilities of the joinery project and allows it to perform more advanced operations such as analytics.

**Solution:** Implement concatenation similar to Python Pandas and allowing user to concatenate either by Inner Join or Outer Join

**Implementation:** Enhanced concatenate method to support both join type INNER and OUTER. Loop over both dataframes and retain the common columns using LinkedHashSet.

## Tests added:

- 1) Concat operation on 2 Dataframes - a) create data frame A with multiple Columns b) create data frame B with multiple columns c) concat will be cross product of data frame A and B.
- 2) Concat operation with **OUTER** Join - a) create data frame A with multiple Columns b) create data frame B with multiple columns c) concat will be cross product of data frame A and B.
- 3) Concat operation with **INNER** Join - a) create data frame A with multiple Columns b) create data frame B with multiple columns c) concat will be inner join product of data frame A and B on joined columns.

## Difficulties encountered:

Build failures in local , had to download aspectJ library.

# Joinery: Issue #93

URL: <https://github.com/cardillo/joinery/issues/93>

NetIDs: eshiafr2, rfraser3

**Issue:** Update writeCsv() function to allow parameter specifying a separator for the CSV

**Root cause:** Methods that don't have a custom parameter for the CSV

**Solution:** Update existing methods to take in a separator parameter

**Implementation:**

- Add the final String separator parameter

- Separate the files based on provided separator parameter

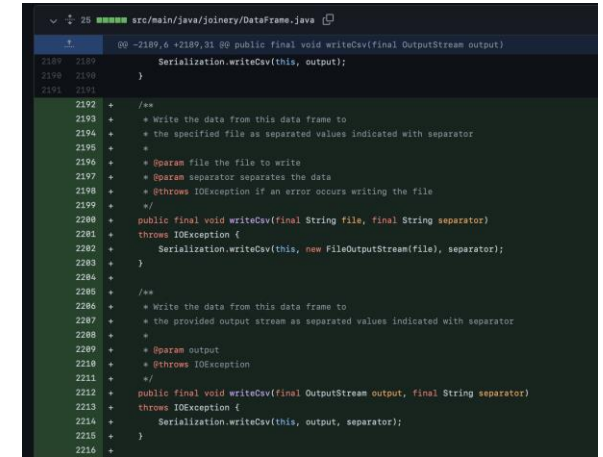
**Tests added:**

- 1) Create Dataframe with multiple columns
- 2) Write to csv as tab / pipe etc as delimiter
- 3) Open CSV and validate the same output in both cases

**Difficulties encountered:**

- Building the project was a difficulty and ran into many issues trying to run the tests.

- Understanding the existing codebase and how to implement the custom parameter for the methods.



```
2189 2189 public final void writeCsv(final OutputStream output)
2190 2190 {
2191 2191     Serialization.writeCsv(this, output);
2192 2192 }
2193 2193
2194 2194 /**
2195 2195  * Write the data from this data frame to
2196 2196  * the specified file as separated values indicated with separator
2197 2197  *
2198 2198  * @param file the file to write
2199 2199  * @param separator separates the data
2200 2200  * @throws IOException if an error occurs writing the file
2201 2201  */
2202 2202 public final void writeCsv(final String file, final String separator)
2203 2203 {
2204 2204     Serialization.writeCsv(this, new FileOutputStream(file), separator);
2205 2205 }
2206 2206
2207 2207 /**
2208 2208  * Write the data from this data frame to
2209 2209  * the provided output stream as separated values indicated with separator
2210 2210  *
2211 2211  * @param output
2212 2212  * @throws IOException
2213 2213  */
2214 2214 public final void writeCsv(final OutputStream output, final String separator)
2215 2215 {
2216 2216     Serialization.writeCsv(this, output, separator);
2217 2217 }
2218 2218
2219 2219 }
```

# Jbot Issue #28

**URL:** <https://github.com/rampatra/jbot/issues/28>

**NetIDs:** vdadi2

**Issue:** Sending files on slack

**Root cause:** New Feature – Currently Jbot doesn't support upload file capability

**Solution:** create a method which uses slack web API, meteoroid library to support uploading files using Jbot

**Implementation:**

Added method to get details such as channel information, user tokens and file information.

Add logic for uploading the file when a user request specific information.

**Tests added:**

- 1) User shares the location of the file
- 2) Bot transmits the file to the user
- 3) User can read the file using slack or download it locally for consumption.

**Difficulties encountered:**

Jbot uses a slack RTM API which doesn't support file upload capability, transitioning to Web API and using meteoroid which requires a different version of maven.

# Jbot: Issue #114

URL: <https://github.com/rampatra/jbot/issues/114>

NetIDs: malara2, eshiafr2

**Issue:** The project is not building with the current set of dependencies defined

**Root cause:** Springboot version 1.4.0 RELEASE is not compatible with Java 1.8

**Solution:** Correct the dependencies in the pom.xml file

**Implementation:**

Add 1.5.3 RELEASE to in the dependencies list. This is the version that is compatible with Java 1.8

**Tests added:**

The project failed to build and therefore so did the test. However, when built with the new dependencies the project was verified to be working.

**Difficulties encountered:**

Issues with slack Api integration after successful build



# Jbot: Issue #171

URL: <https://github.com/rampatra/jbot/issues/171>

NetIDs: eshiafr2, malara2

**Issue:** Function stopConversation(event) is not stopping the conversation

**Root cause:** Legacy API no longer supports incoming messages

**Solution:** Verify that the stopConversation(event) works via in depth testing

**Implementation:**

- Created unit tests to verify that stop event was working

- Ironed out bugs associated with the stopConversation event

**Tests added:**

- Assert that conversation is stopped only when the user chooses to not request for a meeting upon being asked

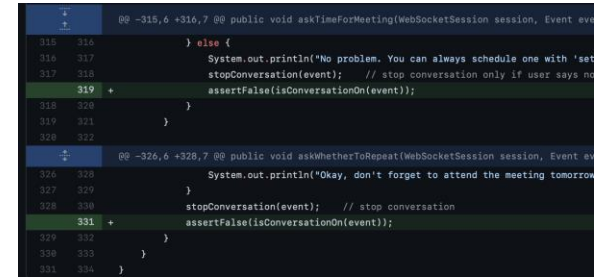
- Assert that conversation is stopped always when the user is asked to repeat

**Difficulties encountered:**

- Building the project was a difficulty and ran into many issues trying to run the tests.

- Understanding why the issue was failing and how to recreate the bug was difficult

- Project needs to start using the new supported Api rather than the deprecated legacy Api for slack



```
315 316    } else {
316 317        System.out.println("No problem. You can always schedule one with 'set
317 318        stopConversation(event); // stop conversation only if user says no
318 319        assertFalse(isConversationOn(event));
319 320    }
320 321    }
321 322    }
322 323    }
323 324    }

326 326    @Override public void askWhetherToRepeat(WebsocketSession session, Event ev
327 328    {
328 329        System.out.println("Okay, don't forget to attend the meeting tomorrow
329 330        stopConversation(event); // stop conversation
330 331        assertFalse(isConversationOn(event));
331 332    }
332 333    }
333 334    }
```

# Jbot Issue #172

**URL:** <https://github.com/rampatra/jbot/issues/172>

**NetIDs:** vdadi2

**Issue:** excel data read

**Root cause:** There is no way to share an excel file and read the information present in the file

**Solution:** Provide a method to preview excel information and upload excel file from Jbot

**Implementation:**

Added method which implements slack Web API, JXL library to upload excel files and read read in excel file

Added logic to preview the excel file information by mentioning row, column

**Tests added:**

- 1) Share the file location
- 2) Bot transmits the excel to the user
- 3) User asks bot to read a particular cell from excel
- 4) Bot reads the cell and information is validated by the user

**Difficulties encountered:**

JXL library has a dependency with springframework due to which okhttp3 was not recognized.

# Jbot Issue #197

**URL:** <https://github.com/rampatra/jbot/issues/197>

**NetIDs:** malara2

**Issue:** Schedule Meeting time accepts any string. Needs time validation

**Root cause:** There is no form of date validation when receiving time

**Solution:** provide method that ensures that date/time of a meeting is in the valid format

**Implementation:**

- Added method to validate date/time to base bot for use in both facebook and slack bots

- Add logic associated with replying to the user about invalid time and loop it back into an event.

**Tests added:** Total of 4 (2 for Facebook and 2 for Slack)

- Assert that invalid time has a facebook/slack response that their entry was invalid.

- Assert that a valid time for a meeting will respond with a success and meeting event created.

**Difficulties encountered:**

- Jbot uses a legacy slack api that lost support a couple weeks ago, had difficulty working around it. Incoming messages were no longer functioning.

Static code analysis screenshots

No warnings or issues from our projects code were found in this report.

These are a previous set of issues that the project had from before.

Large list of issues that cannot be resolved within scope of project

# PMD Joinery Report

```
/home/ubuntu/jbot/jbot-example/src/main/java/example/jbot/JbotApplication.java:7: UseUtilityClass: All methods are static. Consider using a utility class instead. Alternatively, you could add a private constructor or make the class abstract t
/home/ubuntu/jbot/jbot-example/src/main/java/example/jbot/facebook/FbBot.java:7: UnnecessaryImport: Unused import 'me.ranswaroop.jbot.core.facebook.models.*'
/home/ubuntu/jbot/jbot-example/src/main/java/example/jbot/facebook/FbBot.java:11: UnnecessaryImport: Unused import 'javax.annotation.PostConstruct'
/home/ubuntu/jbot/jbot-example/src/main/java/example/jbot/slack/SlackWebhooks.java:56: GuardLogStatement: Logger calls should be surrounded by log level guards.
/home/ubuntu/jbot/jbot-example/src/test/java/example/jbot/facebook/FbBotTest.java:35: UnusedPrivateField: Avoid unused private fields such as 'restTemplate'.
/home/ubuntu/jbot/jbot-example/src/test/java/example/jbot/facebook/FbBotTest.java:44: MethodNamingConventions: The JUnit 4 test method name 'When_PostBackInCallback_Then_InvokeOnReceivePostBack' doesn't match '[a-z][a-zA-Z0-9]*'
/home/ubuntu/jbot/jbot-example/src/test/java/example/jbot/facebook/FbBotTest.java:54: MethodNamingConventions: The JUnit 4 test method name 'When_QuickReplyInCallback_Then_InvokeOnReceiveQuickReply' doesn't match '[a-z][a-zA-Z0-9]*'
/home/ubuntu/jbot/jbot-example/src/test/java/example/jbot/facebook/FbBotTest.java:65: MethodNamingConventions: The JUnit 4 test method name 'When_ConversationPatternInCallback_Then_StartConversation' doesn't match '[a-z][a-zA-Z0-9]*'
/home/ubuntu/jbot/jbot-example/src/test/java/example/jbot/facebook/FbBotTest.java:100: MethodNamingConventions: The JUnit 4 test method name 'Given_InConversation.When_AnswerNoInCallback_Then_StopConversation' doesn't match '[a-z][a-zA-Z0-9]*'
/home/ubuntu/jbot/jbot-example/src/test/java/example/jbot/slack/SlackBotTest.java:65: MethodNamingConventions: The JUnit 4 test method name 'When_DirectMention_Then_InvokeOnDirectMention' doesn't match '[a-z][a-zA-Z0-9]*'
/home/ubuntu/jbot/jbot-example/src/test/java/example/jbot/slack/SlackBotTest.java:75: MethodNamingConventions: The JUnit 4 test method name 'When_DirectMessage_Then_InvokeOnDirectMessage' doesn't match '[a-z][a-zA-Z0-9]*'
/home/ubuntu/jbot/jbot-example/src/test/java/example/jbot/slack/SlackBotTest.java:86: MethodNamingConventions: The JUnit 4 test method name 'When_MessageWithPattern_Then_InvokeOnReceiveMessageWithPattern' doesn't match '[a-z][a-zA-Z0-9]*'
/home/ubuntu/jbot/jbot-example/src/test/java/example/jbot/slack/SlackBotTest.java:100: MethodNamingConventions: The JUnit 4 test method name 'When_DirectMessageWithPattern_Then_InvokeOnDirectMessage' doesn't match '[a-z][a-zA-Z0-9]*'
/home/ubuntu/jbot/jbot-example/src/test/java/example/jbot/slack/SlackBotTest.java:111: MethodNamingConventions: The JUnit 4 test method name 'When_MessageWithPatternAndPatternFlags_Then_InvokeOnReceiveMessageWithPatternAndPatternFlags' doesn't
/home/ubuntu/jbot/jbot-example/src/test/java/example/jbot/slack/SlackBotTest.java:122: MethodNamingConventions: The JUnit 4 test method name 'When_DirectMessage_Then_InvokeOnPinAdded' doesn't match '[a-z][a-zA-Z0-9]*'
/home/ubuntu/jbot/jbot-example/src/test/java/example/jbot/slack/SlackBotTest.java:138: MethodNamingConventions: The JUnit 4 test method name 'When_DirectMessage_Then_InvokeOnPinShared' doesn't match '[a-z][a-zA-Z0-9]*'
/home/ubuntu/jbot/jbot-example/src/test/java/example/jbot/slack/SlackBotTest.java:149: MethodNamingConventions: The JUnit 4 test method name 'When_UserJoinsChannel_Then_InvokeOnMemberJoinedChannel' doesn't match '[a-z][a-zA-Z0-9]*'
/home/ubuntu/jbot/jbot-example/src/test/java/example/jbot/slack/SlackBotTest.java:159: MethodNamingConventions: The JUnit 4 test method name 'When_UserLeavesChannel_Then_InvokeOnMemberLeftChannel' doesn't match '[a-z][a-zA-Z0-9]*'
/home/ubuntu/jbot/jbot-example/src/test/java/example/jbot/slack/SlackBotTest.java:173: MethodNamingConventions: The JUnit 4 test method name 'When_ConversationPattern_Then_StartConversation' doesn't match '[a-z][a-zA-Z0-9]*'
/home/ubuntu/jbot/jbot-example/src/test/java/example/jbot/slack/SlackBotTest.java:208: MethodNamingConventions: The JUnit 4 test method name 'Given_InConversation.When_AnswerNo_Then_StopConversation' doesn't match '[a-z][a-zA-Z0-9]*'
/home/ubuntu/jbot/jbot-example/src/test/java/example/jbot/slack/SlackBotTest.java:239: MethodNamingConventions: The JUnit 4 test method name 'Given_InConversation.When_InvalidTimeChars' doesn't match '[a-z][a-zA-Z0-9]*'
/home/ubuntu/jbot/jbot-example/src/test/java/example/jbot/slack/SlackBotTest.java:262: MethodNamingConventions: The JUnit 4 test method name 'Given_InConversation.When_InvalidTime' doesn't match '[a-z][a-zA-Z0-9]*'
/home/ubuntu/jbot/jbot-example/src/test/java/example/jbot/slack/SlackSlashCommandTest.java:29: MethodNamingConventions: The JUnit 4 test method name 'onReceiveSlashCommand.When_IncorrectToken_Should_ReturnSorryRichMessage' doesn't match '[a-z][
/home/ubuntu/jbot/jbot/src/main/java/me/ranswaroop/jbot/core/common/BaseBot.java:18: UnusedPrivateField: Avoid unused private fields such as 'logger'.
/home/ubuntu/jbot/jbot/src/main/java/me/ranswaroop/jbot/core/common/BaseBot.java:89: ControlStatementBraces: This statement should have braces
/home/ubuntu/jbot/jbot/src/main/java/me/ranswaroop/jbot/core/common/BaseBot.java:108: SimplifyBooleanReturns: Avoid unnecessary if..then..else statements when returning booleans
/home/ubuntu/jbot/jbot/src/main/java/me/ranswaroop/jbot/core/common/BaseBot.java:222: ControlStatementBraces: This statement should have braces
/home/ubuntu/jbot/jbot/src/main/java/me/ranswaroop/jbot/core/common/BaseBot.java:223: ControlStatementBraces: This statement should have braces
/home/ubuntu/jbot/jbot/src/main/java/me/ranswaroop/jbot/core/common/BaseBot.java:227: ControlStatementBraces: This statement should have braces
/home/ubuntu/jbot/jbot/src/main/java/me/ranswaroop/jbot/core/common/BaseBot.java:228: ControlStatementBraces: This statement should have braces
/home/ubuntu/jbot/jbot/src/main/java/me/ranswaroop/jbot/core/common/BaseBot.java:229: ControlStatementBraces: This statement should have braces
/home/ubuntu/jbot/jbot/src/main/java/me/ranswaroop/jbot/core/common/BaseBot.java:230: ControlStatementBraces: This statement should have braces
/home/ubuntu/jbot/jbot/src/main/java/me/ranswaroop/jbot/core/facebook/Bot.java:6: UnnecessaryImport: Unused import 'me.ranswaroop.jbot.core.facebook.models.*'
/home/ubuntu/jbot/jbot/src/main/java/me/ranswaroop/jbot/core/facebook/Bot.java:10: UnnecessaryImport: Unused import 'org.springframework.beans.factory.annotation.Value'
/home/ubuntu/jbot/jbot/src/main/java/me/ranswaroop/jbot/core/facebook/Bot.java:15: UnnecessaryImport: Unused import 'org.springframework.web.bind.annotation.*'
/home/ubuntu/jbot/jbot/src/main/java/me/ranswaroop/jbot/core/facebook/Bot.java:45: UnusedPrivateMethod: Avoid unused private methods such as 'constructFbSendUrl()'.
/home/ubuntu/jbot/jbot/src/main/java/me/ranswaroop/jbot/core/facebook/Bot.java:95: LiteralsFirstInComparisons: Position literals first in String comparisons
/home/ubuntu/jbot/jbot/src/main/java/me/ranswaroop/jbot/core/facebook/Bot.java:138: GuardLogStatement: Logger calls should be surrounded by log level guards.
/home/ubuntu/jbot/jbot/src/main/java/me/ranswaroop/jbot/core/facebook/Bot.java:156: GuardLogStatement: Logger calls should be surrounded by log level guards.
/home/ubuntu/jbot/jbot/src/main/java/me/ranswaroop/jbot/core/facebook/Bot.java:160: GuardLogStatement: Logger calls should be surrounded by log level guards.
/home/ubuntu/jbot/jbot/src/main/java/me/ranswaroop/jbot/core/facebook/Bot.java:269: UseLocaleWithCaseConversions: When doing a String.toLowerCase()/toUpperCase() call, use a Locale
/home/ubuntu/jbot/jbot/src/main/java/me/ranswaroop/jbot/core/facebook/Bot.java:270: ControlStatementBraces: This statement should have braces
/home/ubuntu/jbot/jbot/src/main/java/me/ranswaroop/jbot/core/slack/Bot.java:116: GuardLogStatement: Logger calls should be surrounded by log level guards.
/home/ubuntu/jbot/jbot/src/main/java/me/ranswaroop/jbot/core/slack/Bot.java:127: GuardLogStatement: Logger calls should be surrounded by log level guards.
/home/ubuntu/jbot/jbot/src/main/java/me/ranswaroop/jbot/core/slack/Bot.java:157: GuardLogStatement: Logger calls should be surrounded by log level guards.
/home/ubuntu/jbot/jbot/src/main/java/me/ranswaroop/jbot/core/slack/Bot.java:172: UseLocaleWithCaseConversions: When doing a String.toLowerCase()/toUpperCase() call, use a Locale
/home/ubuntu/jbot/jbot/src/main/java/me/ranswaroop/jbot/core/slack/Bot.java:185: GuardLogStatement: Logger calls should be surrounded by log level guards.
/home/ubuntu/jbot/jbot/src/main/java/me/ranswaroop/jbot/core/slack/Bot.java:239: UseLocaleWithCaseConversions: When doing a String.toLowerCase()/toUpperCase() call, use a Locale
/home/ubuntu/jbot/jbot/src/main/java/me/ranswaroop/jbot/core/slack/Bot.java:240: ControlStatementBraces: This statement should have braces
/home/ubuntu/jbot/jbot/src/main/java/me/ranswaroop/jbot/core/slack/models/Message.java:41: UncommentedEmptyConstructor: Document empty constructor
/home/ubuntu/jbot/jbot/src/main/java/me/ranswaroop/jbot/core/slack/models/RichMessage.java:21: UncommentedEmptyConstructor: Document empty constructor
```

# FMB Jbot Report

```
de.flapdoodle.embed.mongo.MongodExecutable
io.undertow.websockets.core.WebSocketChannel
javax.xml.bind.PropertyException
org.glassfish.tyrus.core.WebSocketApplication
javax.management.InstanceAlreadyExistsException
com.caucho.burlap.client.BurlapRuntimeException
org.aspectj.bridge.AbortException
javax.cache.configuration.Configuration
org.springframework.retry.RetryPolicy
org.springframework.retry.backoff.BackOffPolicy
org.apache.tiles.request.servlet.NotAServletEnvironmentException
java.util.prefs.BackingStoreException
org.springframework.security.web.context.AbstractSecurityWebApplicationInitializer
org.springframework.social.twitter.api.Twitter
org.springframework.data.mapping.model.SimpleTypeHolder
org.springframework.data.mapping.model.FieldNameNamingStrategy
org.springframework.data.mongodb.core.mapping.Document
java.util.IllegalFormatException
javax.mail.internet.AddressException
javax.mail.Message
org.apache.kafka.common.serialization.StringDeserializer
org.apache.kafka.clients.consumer.ConsumerConfig
okhttp3.Cache$urls
kotlin.sequences.IndexingSequence$iterator
kotlin.sequences.BackSequence$iterator
```

No warnings or issues from our projects code were found in this report.

These are a previous set of issues that the project had from before.

Large list of issues unrelated to our project (1599 & 1810) that cannot be resolved within scope of project

# PMD Jbot Report

```
/home/ubuntu/jbot/jbot-example/src/main/java/example/jbot/JbotApplication.java:7: UseUtilityClass: All methods are static. Consider using a utility class instead. Alternatively, you could add a private constructor or make the class abstract.
/home/ubuntu/jbot/jbot-example/src/main/java/example/jbot/facebook/FbBot.java:7: UnnecessaryImport: Unused import 'me.ramswaroop.jbot.core.facebook.models.*'
/home/ubuntu/jbot/jbot-example/src/main/java/example/jbot/facebook/FbBot.java:11: UnnecessaryImport: Unused import 'javax.annotation.PostConstruct'
/home/ubuntu/jbot/jbot-example/src/main/java/example/jbot/slack/SlackWebhooks.java:56: GuardLogStatement: Logger calls should be surrounded by log level guards.
/home/ubuntu/jbot/jbot-example/src/main/java/example/jbot/slack/SlackBotTest.java:35: UnusedPrivateField: Avoid unused private fields such as 'restTemplate'.
/home/ubuntu/jbot/jbot-example/src/test/java/example/jbot/facebook/FbBotTest.java:44: MethodNamingConventions: The JUnit 4 test method name 'When_PostbackInCallback_Then_InvokeOnReceivePostback' doesn't match '[a-z][a-zA-Z0-9]*'
/home/ubuntu/jbot/jbot-example/src/test/java/example/jbot/facebook/FbBotTest.java:54: MethodNamingConventions: The JUnit 4 test method name 'When_QuickReplyInCallback_Then_InvokeOnReceiveQuickReply' doesn't match '[a-z][a-zA-Z0-9]*'
/home/ubuntu/jbot/jbot-example/src/test/java/example/jbot/facebook/FbBotTest.java:65: MethodNamingConventions: The JUnit 4 test method name 'When_ConversationPatternInCallback_Then_StartConversation' doesn't match '[a-z][a-zA-Z0-9]*'
/home/ubuntu/jbot/jbot-example/src/test/java/example/jbot/facebook/FbBotTest.java:100: MethodNamingConventions: The JUnit 4 test method name 'Given_InConversation_When_AnswerNoInCallback_Then_StopConversation' doesn't match '[a-z][a-zA-Z0-9]*'
/home/ubuntu/jbot/jbot-example/src/test/java/example/jbot/slack/SlackBotTest.java:65: MethodNamingConventions: The JUnit 4 test method name 'When_DirectMention_Then_InvokeOnDirectMention' doesn't match '[a-z][a-zA-Z0-9]*'
/home/ubuntu/jbot/jbot-example/src/test/java/example/jbot/slack/SlackBotTest.java:75: MethodNamingConventions: The JUnit 4 test method name 'When_DirectMessage_Then_InvokeOnDirectMessage' doesn't match '[a-z][a-zA-Z0-9]*'
/home/ubuntu/jbot/jbot-example/src/test/java/example/jbot/slack/SlackBotTest.java:80: MethodNamingConventions: The JUnit 4 test method name 'When_MessageWithPattern_Then_InvokeOnReceiveMessageWithPattern' doesn't match '[a-z][a-zA-Z0-9]*'
/home/ubuntu/jbot/jbot-example/src/test/java/example/jbot/slack/SlackBotTest.java:100: MethodNamingConventions: The JUnit 4 test method name 'When_DirectMessageWithPattern_Then_InvokeOnDirectMessage' doesn't match '[a-z][a-zA-Z0-9]*'
/home/ubuntu/jbot/jbot-example/src/test/java/example/jbot/slack/SlackBotTest.java:111: MethodNamingConventions: The JUnit 4 test method name 'When_MessageWithPatternAndPatternFlags_Then_InvokeOnReceiveMessageWithPatternAndPatternFlags' doesn't match '[a-z][a-zA-Z0-9]*'
/home/ubuntu/jbot/jbot-example/src/test/java/example/jbot/slack/SlackBotTest.java:122: MethodNamingConventions: The JUnit 4 test method name 'When_DirectMessage_Then_InvokeOnP1Added' doesn't match '[a-z][a-zA-Z0-9]*'
/home/ubuntu/jbot/jbot-example/src/test/java/example/jbot/slack/SlackBotTest.java:138: MethodNamingConventions: The JUnit 4 test method name 'When_DirectMessage_Then_InvokeOnP1IsHere' doesn't match '[a-z][a-zA-Z0-9]*'
/home/ubuntu/jbot/jbot-example/src/test/java/example/jbot/slack/SlackBotTest.java:149: MethodNamingConventions: The JUnit 4 test method name 'When_UserJoinChannel_Then_InvokeOnMemberJoinedChannel' doesn't match '[a-z][a-zA-Z0-9]*'
/home/ubuntu/jbot/jbot-example/src/test/java/example/jbot/slack/SlackBotTest.java:159: MethodNamingConventions: The JUnit 4 test method name 'When_UserLeavesChannel_Then_InvokeOnMemberLeftChannel' doesn't match '[a-z][a-zA-Z0-9]*'
/home/ubuntu/jbot/jbot-example/src/test/java/example/jbot/slack/SlackBotTest.java:173: MethodNamingConventions: The JUnit 4 test method name 'When_ConversationPattern_Then_StartConversation' doesn't match '[a-z][a-zA-Z0-9]*'
/home/ubuntu/jbot/jbot-example/src/test/java/example/jbot/slack/SlackBotTest.java:208: MethodNamingConventions: The JUnit 4 test method name 'Given_InConversation_When_AnswerNo_Then_StopConversation' doesn't match '[a-z][a-zA-Z0-9]*'
/home/ubuntu/jbot/jbot-example/src/test/java/example/jbot/slack/SlackBotTest.java:239: MethodNamingConventions: The JUnit 4 test method name 'Given_InConversation_When_InvalidTimeChars' doesn't match '[a-z][a-zA-Z0-9]*'
/home/ubuntu/jbot/jbot-example/src/test/java/example/jbot/slack/SlackBotTest.java:262: MethodNamingConventions: The JUnit 4 test method name 'Given_InConversation_When_InvalidTime' doesn't match '[a-z][a-zA-Z0-9]*'
/home/ubuntu/jbot/jbot-example/src/test/java/example/jbot/slack/SlashCommandTest.java:29: MethodNamingConventions: The JUnit 4 test method name 'onReceiveSlashCommand_When_IncorrectToken_Should_ReturnSorryRichMessage' doesn't match '[a-z][a-zA-Z0-9]*'
/home/ubuntu/jbot/jbot/src/main/java/me/ramswaroop/jbot/core/common/BaseBot.java:18: UnusedPrivateField: Avoid unused private fields such as 'logger'.
/home/ubuntu/jbot/jbot/src/main/java/me/ramswaroop/jbot/core/common/BaseBot.java:89: ControlStatementBraces: This statement should have braces
/home/ubuntu/jbot/jbot/src/main/java/me/ramswaroop/jbot/core/common/BaseBot.java:188: SimplifyBooleanExpressions: Avoid unnecessary if...then...else statements when returning booleans
/home/ubuntu/jbot/jbot/src/main/java/me/ramswaroop/jbot/core/common/BaseBot.java:221: ControlStatementBraces: This statement should have braces
/home/ubuntu/jbot/jbot/src/main/java/me/ramswaroop/jbot/core/common/BaseBot.java:223: ControlStatementBraces: This statement should have braces
/home/ubuntu/jbot/jbot/src/main/java/me/ramswaroop/jbot/core/common/BaseBot.java:227: ControlStatementBraces: This statement should have braces
/home/ubuntu/jbot/jbot/src/main/java/me/ramswaroop/jbot/core/common/BaseBot.java:228: ControlStatementBraces: This statement should have braces
/home/ubuntu/jbot/jbot/src/main/java/me/ramswaroop/jbot/core/common/BaseBot.java:229: ControlStatementBraces: This statement should have braces
/home/ubuntu/jbot/jbot/src/main/java/me/ramswaroop/jbot/core/common/BaseBot.java:230: ControlStatementBraces: This statement should have braces
/home/ubuntu/jbot/jbot/src/main/java/me/ramswaroop/jbot/core/facebook/Bot.java:6: UnnecessaryImport: Unused import 'me.ramswaroop.jbot.core.facebook.models.*'
/home/ubuntu/jbot/jbot/src/main/java/me/ramswaroop/jbot/core/facebook/Bot.java:10: UnnecessaryImport: Unused import 'org.springframework.beans.factory.annotation.Value'
/home/ubuntu/jbot/jbot/src/main/java/me/ramswaroop/jbot/core/facebook/Bot.java:15: UnnecessaryImport: Unused import 'org.springframework.web.bind.annotation.*'
/home/ubuntu/jbot/jbot/src/main/java/me/ramswaroop/jbot/core/facebook/Bot.java:45: UnusedPrivateMethod: Avoid unused private methods such as 'constructFbSendUrl()'.
/home/ubuntu/jbot/jbot/src/main/java/me/ramswaroop/jbot/core/facebook/Bot.java:95: LiteralStringValueComparisons: Position literals first in String comparisons
/home/ubuntu/jbot/jbot/src/main/java/me/ramswaroop/jbot/core/facebook/Bot.java:139: GuardLogStatement: Logger calls should be surrounded by log level guards.
/home/ubuntu/jbot/jbot/src/main/java/me/ramswaroop/jbot/core/facebook/Bot.java:156: GuardLogStatement: Logger calls should be surrounded by log level guards.
/home/ubuntu/jbot/jbot/src/main/java/me/ramswaroop/jbot/core/facebook/Bot.java:160: GuardLogStatement: Logger calls should be surrounded by log level guards.
/home/ubuntu/jbot/jbot/src/main/java/me/ramswaroop/jbot/core/facebook/Bot.java:269: UseLocaleWithCaseConversions: When doing a String.toLowerCase()/toUpperCase() call, use a Locale
/home/ubuntu/jbot/jbot/src/main/java/me/ramswaroop/jbot/core/facebook/Bot.java:270: ControlStatementBraces: This statement should have braces
/home/ubuntu/jbot/jbot/src/main/java/me/ramswaroop/jbot/core/slack/Bot.java:116: GuardLogStatement: Logger calls should be surrounded by log level guards.
/home/ubuntu/jbot/jbot/src/main/java/me/ramswaroop/jbot/core/slack/Bot.java:127: GuardLogStatement: Logger calls should be surrounded by log level guards.
/home/ubuntu/jbot/jbot/src/main/java/me/ramswaroop/jbot/core/slack/Bot.java:157: GuardLogStatement: Logger calls should be surrounded by log level guards.
/home/ubuntu/jbot/jbot/src/main/java/me/ramswaroop/jbot/core/slack/Bot.java:172: UseLocaleWithCaseConversions: When doing a String.toLowerCase()/toUpperCase() call, use a Locale
/home/ubuntu/jbot/jbot/src/main/java/me/ramswaroop/jbot/core/slack/Bot.java:185: GuardLogStatement: Logger calls should be surrounded by log level guards.
/home/ubuntu/jbot/jbot/src/main/java/me/ramswaroop/jbot/core/slack/Bot.java:239: UseLocaleWithCaseConversions: When doing a String.toLowerCase()/toUpperCase() call, use a Locale
/home/ubuntu/jbot/jbot/src/main/java/me/ramswaroop/jbot/core/slack/Bot.java:240: ControlStatementBraces: This statement should have braces
/home/ubuntu/jbot/jbot/src/main/java/me/ramswaroop/jbot/core/slack/Bot.java:359: UseLocaleWithCaseConversions: When doing a String.toLowerCase()/toUpperCase() call, use a Locale
/home/ubuntu/jbot/jbot/src/main/java/me/ramswaroop/jbot/core/slack/models/Message.java:41: UncommentedEmptyConstructor: Document empty constructor
/home/ubuntu/jbot/jbot/src/main/java/me/ramswaroop/jbot/core/slack/models/RichMessage.java:21: UncommentedEmptyConstructor: Document empty constructor
```

- No Issues or warnings added to the list generated by this report.
- Our code matched all the requirements to pass the pmd report.



# PMD Joinery Report

```
mmunjal2@fa21-cs427-150:~$ head -30 PMD_Joinery_Report_Before.txt
/home/mmunjal2/joinery/src/main/java/joinery/DataFrame.java:246: ForLoopCanBeForeach: This for loop can be replaced by a foreach loop
/home/mmunjal2/joinery/src/main/java/joinery/DataFrame.java:1881: OptimizableToArrayCall: This call to Collection.toArray() may be optimizable
/home/mmunjal2/joinery/src/main/java/joinery/DataFrame.java:1900: OptimizableToArrayCall: This call to Collection.toArray() may be optimizable
/home/mmunjal2/joinery/src/main/java/joinery/DataFrame.java:2445: UnnecessaryModifier: Unnecessary modifier 'static' on enum 'NumberDefault': nested enums are implicit
/home/mmunjal2/joinery/src/main/java/joinery/impl/Aggregation.java:37: UseUtilityClass: All methods are static. Consider using a utility class instead. Alternatively,
tructor or make the class abstract to silence this warning.
/home/mmunjal2/joinery/src/main/java/joinery/impl/Aggregation.java:42: PrimitiveWrapperInstantiation: Do not use 'new Integer(...)', prefer 'Integer.valueOf(...)'
/home/mmunjal2/joinery/src/main/java/joinery/impl/Aggregation.java:228: UnnecessaryModifier: Unnecessary modifier 'final' on method 'name': private methods cannot be overri
/home/mmunjal2/joinery/src/main/java/joinery/impl/Aggregation.java:253: PrimitiveWrapperInstantiation: Do not use 'new Double(...)', prefer 'Double.valueOf(...)'
/home/mmunjal2/joinery/src/main/java/joinery/impl/Aggregation.java:254: PrimitiveWrapperInstantiation: Do not use 'new Double(...)', prefer 'Double.valueOf(...)'
/home/mmunjal2/joinery/src/main/java/joinery/impl/Aggregation.java:255: PrimitiveWrapperInstantiation: Do not use 'new Double(...)', prefer 'Double.valueOf(...)'
/home/mmunjal2/joinery/src/main/java/joinery/impl/Aggregation.java:256: PrimitiveWrapperInstantiation: Do not use 'new Double(...)', prefer 'Double.valueOf(...)'
/home/mmunjal2/joinery/src/main/java/joinery/impl/Aggregation.java:257: PrimitiveWrapperInstantiation: Do not use 'new Double(...)', prefer 'Double.valueOf(...)'
/home/mmunjal2/joinery/src/main/java/joinery/impl/Aggregation.java:258: PrimitiveWrapperInstantiation: Do not use 'new Double(...)', prefer 'Double.valueOf(...)'
/home/mmunjal2/joinery/src/main/java/joinery/impl/Aggregation.java:282: ForLoopCanBeForeach: This for loop can be replaced by a foreach loop
/home/mmunjal2/joinery/src/main/java/joinery/impl/Combining.java:35: UseUtilityClass: All methods are static. Consider using a utility class instead. Alternatively,
tructor or make the class abstract to silence this warning.
/home/mmunjal2/joinery/src/main/java/joinery/impl/Combining.java:118: OptimizableToArrayCall: This call to Collection.toArray() may be optimizable
/home/mmunjal2/joinery/src/main/java/joinery/impl/Comparison.java:26: UseUtilityClass: All methods are static. Consider using a utility class instead. Alternatively,
tructor or make the class abstract to silence this warning.
/home/mmunjal2/joinery/src/main/java/joinery/impl/Conversion.java:39: UseUtilityClass: All methods are static. Consider using a utility class instead. Alternatively,
tructor or make the class abstract to silence this warning.
/home/mmunjal2/joinery/src/main/java/joinery/impl/Conversion.java:233: PrimitiveWrapperInstantiation: Do not use 'new Double(...)', prefer 'Double.valueOf(...)'
/home/mmunjal2/joinery/src/main/java/joinery/impl/Conversion.java:249: EmptyStatementNotInLoop: An empty statement (semicolon) not part of a loop
/home/mmunjal2/joinery/src/main/java/joinery/impl/Conversion.java:261: ControlStatementBraces: This statement should have braces
/home/mmunjal2/joinery/src/main/java/joinery/impl/Conversion.java:289: UselessParentheses: Useless parentheses.
/home/mmunjal2/joinery/src/main/java/joinery/impl/Conversion.java:293: ControlStatementBraces: This statement should have braces
/home/mmunjal2/joinery/src/main/java/joinery/impl/Conversion.java:312: ForLoopCanBeForeach: This for loop can be replaced by a foreach loop
/home/mmunjal2/joinery/src/main/java/joinery/impl/Conversion.java:368: PrimitiveWrapperInstantiation: Do not use 'new Long(...)', prefer 'Long.valueOf(...)'
/home/mmunjal2/joinery/src/main/java/joinery/impl/Conversion.java:379: PrimitiveWrapperInstantiation: Do not use 'new Double(...)', prefer 'Double.valueOf(...)'
/home/mmunjal2/joinery/src/main/java/joinery/impl/Conversion.java:391: PrimitiveWrapperInstantiation: Do not use 'new Boolean(true)', prefer 'Boolean.TRUE'
/home/mmunjal2/joinery/src/main/java/joinery/impl/Conversion.java:393: PrimitiveWrapperInstantiation: Do not use 'new Boolean(false)', prefer 'Boolean.FALSE'
/home/mmunjal2/joinery/src/main/java/joinery/impl/Display.java:52: UseUtilityClass: All methods are static. Consider using a utility class instead. Alternatively,
tructor or make the class abstract to silence this warning.
/home/mmunjal2/joinery/src/main/java/joinery/impl/Display.java:192: UnnecessaryModifier: Unnecessary modifier 'final' on method 'title': private methods cannot be overr
mmunjal2@fa21-cs427-150:~$ diff PMD_Joinery_Report_Before.txt PMD_Joinery_Report_After.txt
mmunjal2@fa21-cs427-150:~$
```

- No additional Issue or warning to the report after fixing our issues. It's shown in DIFF command also.
- Our code matched all the requirements to pass the pmd report.

# FMB Joinery Report

```
[mmunjal2@fa21-cs427-150:~]$ head -30 FMB_Joinery_After.txt
M V EI2: new joinery.impl.Conversion$VariableToDummyResult(List, String[]) may expose internal representation by storing an externally mutable object into Conversion$VariableToDummyResult.names At Conversion.java:[line 279]
M P Bx: joinery.impl.Conversion$LongConversion.apply(Object) invokes inefficient new Long(String) constructor; use Long.valueOf(String) instead At Conversion.java:[line 368]
M B FS: Format string should use %n rather than \n in joinery.impl.SparseBitSet.parameters() At SparseBitSet.java:[line 197]
M B FS: Format string should use %n rather than \n in joinery.impl.SparseBitSet.parameters() At SparseBitSet.java:[line 198]
M B FS: Format string should use %n rather than \n in joinery.impl.SparseBitSet.parameters() At SparseBitSet.java:[line 199]
M B FS: Format string should use %n rather than \n in joinery.impl.SparseBitSet.parameters() At SparseBitSet.java:[line 200]
M B FS: Format string should use %n rather than \n in joinery.impl.SparseBitSet.parameters() At SparseBitSet.java:[line 201]
M P Bx: joinery.impl.Aggregation$Count.apply(List) invokes inefficient new Integer(int) constructor; use Integer.valueOf(int) instead At Aggregation.java:[line 42]
M D UC: Useless object stored in variable columns of method joinery.impl.Serialization.writeSql(DataFrame, PreparedStatement) At Serialization.java:[line 455]
H I Dm: Found reliance on default encoding in joinery.impl.Serialization.readCsv(InputStream, String, DataFrame$NumberDefault, String, boolean): new java.io.InputStreamReader(InputStream) At Serialization.java:[line 266]
H I Dm: Found reliance on default encoding in joinery.impl.Serialization.writeCsv(DataFrame, OutputStream): new java.io.OutputStreamWriter(OutputStream) At Serialization.java:[line 301]
M B NP: joinery.impl.Conversion$BooleanConversion.apply(Object) has Boolean return type and returns explicit null At Conversion.java:[line 395]
M P Dm: joinery.impl.Conversion$BooleanConversion.apply(Object) invokes inefficient Boolean constructor; use Boolean.valueOf(...) instead At Conversion.java:[line 391]
M P SBSC: joinery.impl.Display.dateFormat(List) concatenates strings using + in a loop At Display.java:[line 232]
M B FS: Format string should use %n rather than \n in joinery.impl.Shell$Repl.run() At Shell.java:[line 92]
H I Dm: Found reliance on default encoding in joinery.impl.Shell$Repl.console(InputStream): new java.io.InputStreamReader(InputStream) At Shell.java:[line 228]
M B FS: Format string should use %n rather than \n in joinery.DataFrame.main(String[]) At DataFrame.java:[line 2497]
M X OBL: joinery.DataFrame.writeSql(Connection, String) may fail to clean up java.sql.Statement Obligation to clean up resource created at DataFrame.java:[line 2315] is not discharged
M P WMI: joinery.impl.Pivoting.pivot(Map, Map, Set) makes inefficient use of keySet iterator instead of entrySet iterator At Pivoting.java:[line 83]
M B FS: Format string should use %n rather than \n in joinery.impl.Shell$Repl$SourceReader.readLine(String) At Shell.java:[line 265]
M C FS: Format-string method java.io.PrintStream.printf(String, Object[]) called with format string "%s%s\n" wants 2 arguments but is given 3 in joinery.impl.Shell$Repl$SourceReader.readLine(String) At Shell.java:[line 265]
H I Dm: Found reliance on default encoding in new joinery.impl.Shell$Repl$SourceReader(Shell$Repl, String): new java.io.FileReader(String) At Shell.java:[line 257]
M V MS: joinery.impl.Conversion.dummyVariableMaxLen should be package protected At Conversion.java:[line 41]
[mmunjal2@fa21-cs427-150:~]$ diff FMB_Joinery_Before.txt FMB_Joinery_After.txt
[mmunjal2@fa21-cs427-150:~]$
```

- No additional Issue or warning to the report after fixing our issues. It's shown in DIFF command also.
- Our code matched all the requirements to pass the FMB report.

# Concluding Remarks – Part 1

What lessons did you learn from your project?

Ryan: importance of understanding the code base of a project, its libraries, its dependencies, etc. before beginning work

Muaath: When selecting an open source project make sure it has a long history of being supported and backed.

Piyush : Pair programming , avoid programming by coincidence , importance of automation tools (e.g. PMD , Find Bugs)

Eshia: Contributing to an open-source project, how testing and debugging is relevant and critical

Nilesh: How open source projects run and how one feature might break another, importance of finding bugs and debugging, unit-testing

Mohit - Importance of JUnit test cases , learnt new static code analysis tools and collaborating with diverse team remotely.

What was difficult?

Ryan: getting the project to build and understanding why it wouldn't.

Piyush : team members in diff. Geographical location , hard to co-ordinate meetings.

Muaath: Coordination with everyones busy schedule. Working around jbot's use of a slacks legacy api that stopped working recently.

Eshia: Coordinating meetings across various timezones, reading and understanding how to implement and fix issues in existing codebases, building the projects

Nilesh: Coordinating with different timezones, lack of functionality in RTM api and reliance on third party library, understanding codebases

Mohit : Most difficult part was co-ordination with team as people are in diff. Time zones and working Full time.

What do you wish you could have done (or done differently)?

Ryan: wish I would have been a bit less stubborn and looked for other ways to fix the issue. Would also have been easier to meet with classmates in person to talk through solutions. I would focus less on finding the most efficient solution the first time, and would have started by getting any solution that works, then improving upon that.

Piyush :- Could have focused proportionally on presentation and documentation to showcase equivalent effort spent.

Muaath: I wish I would have chosen a project with a better reputation of being backed.

Eshia: I wish I could've understood the scope of each project that I worked on

Nilesh: Not enough time to select the project, projects had multiple dependencies which made it harder to work on

Mohit : spent more time with my team mates , planned collaboration would have been better .

# Concluding Remarks – Part 2

How could your project be extended...what's next?

Ryan: Make existing methods more robust, make new methods we wrote more efficient

*Existing methods have nuanced and subtle changes in behavior as packages age – would be interesting to see which methods have changed and if there is a more timeless way to build them*

*Some of the solutions work quite well, such as writeCsv, but might have performance issues if trying to rapidly create a huge amount of CSVs, create high-frequency logs, etc.*

Piyush : More Data and Analytics Use cases can be included (performance optimization when dealing with Dataframes).

Muaath: Jbot needs to be reworked from the ground up to use the new Api slack recommends. This would actually resolve majority of the issues on the github board. ( This would require a lot of changes and is out of the projects scope)

Eshia: Fix the pending issues and include more JUnit tests for better debugging

Nilesh: Jbot lacks any kind of AI capability which is quite common across the industry now, it needs to be rearchitected to use latest slack API and support cognitive services out of the box.

Mohit - Add more enhancements to Joinery .

Are there any interesting problems or questions that resulted from your work?

Muaath: Learning the codebase of an open source projects takes a lot of time and work.

*We spent a few hours on Alexa/bumptech glide and could not get them to work or build correctly.*

*A lot of work simply does not show up on either the readme or github because of this discovery phase.*

*I feel everyone in the group put in effort but depending on the issue and its learning curve that really did not show up in the reports.*

Ryan: the issue of a project having old or deprecated libraries and packages seems like it could be an entire course on its own

*you can assume you know how others will use your code but you can't actually ever know unless they tell/show you are there tools that can go a step further in "solving" build issues?*

*what is the best path forward when a core library you rely on has a known bug? Work around it? What if they fix the bug?*

Ryan: I had heard developers complain that measuring progress by lines of code written is a bad way to track how much each developer contributed, and now I know why. Sometimes getting 10 lines of code to function correctly can be harder than writing 400 lines of something else. Just like the real-world, it's hard to convey this at times.

*Spent over a week just getting Joinery to build so we could even work on it*

*Spent over a week attempting to use DataFrame.add() method which treats lists differently depending on JDK version (as a single object versus iterating over it)*