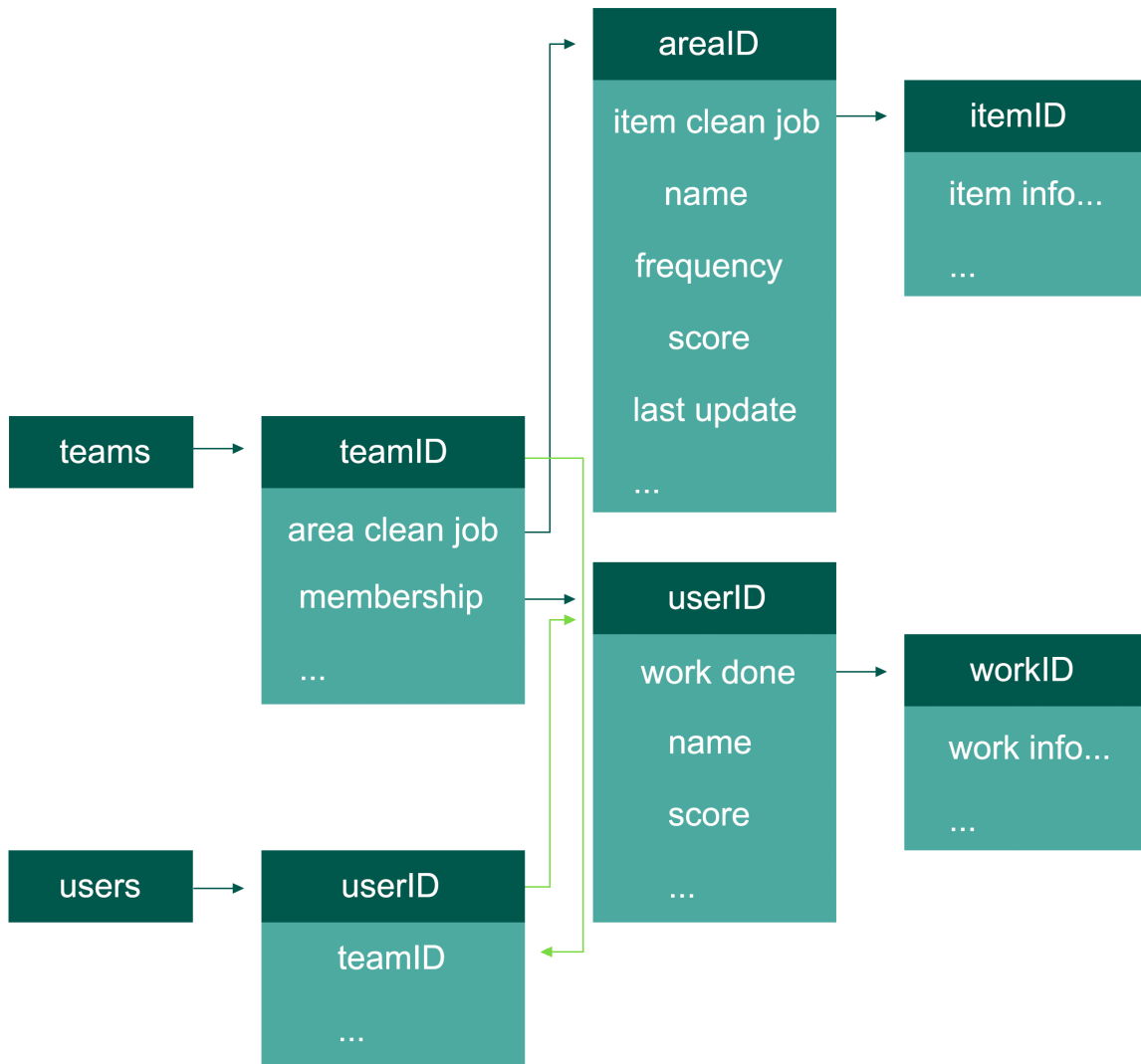


Project Report

1. **Title:** Tidy
2. **Project description:** An Android app to help users and groups set up tailored plans for housework
3. **Team members:** None
4. **APIs and features:** Firebase auth for authorization. Firestore for data storage and data sharing. Shared custom toolbar among fragments at top for naming and sign out. AutoCompleteTextView for text suggestion pop up. Android Vector Asset for converting designed svg icons to vector drawable XML.
5. **MPAndroidChart library:** Draw bar chart with animation for user scores. The library is powerful for generating graph view. I am only supposed to set up a layout and provide the data, then I could get a beautiful chart with features like animation and zoom in, which is really nice. However, it demands specific data type which sometimes is a little bit hard to understand and implement. The layout feature (like component, text size and color) has to be set up manually at run time, which means no preview for UI design. The UI design is editable in general, but almost impossible to get exactly what you want since everything is wrapped up in component.
6. **UI/UX:** I have drawn due/overdue time bar and some other icons in Illustrator and convert them to XML by vector set. The due/overdue XML are named accordingly in order to be fetched at the run time when the due/overdue is calculated. It demands some work and looks silly. But it is really maintainable to have those individual drawable XML files since it is easy to customize or replace any of them.
7. **Data Model:** The design and implementation of the data model with firestore actually takes most of my time and effort. Since firestore is a NoSQL database, I have to somehow manually keep and bind all the foreign-key relationships of document/collection when they are created or updated. There are two main challenges:
 1. Shared access across user groups
 2. Nested area clean job and item clean job.Below is a diagram of the data model.

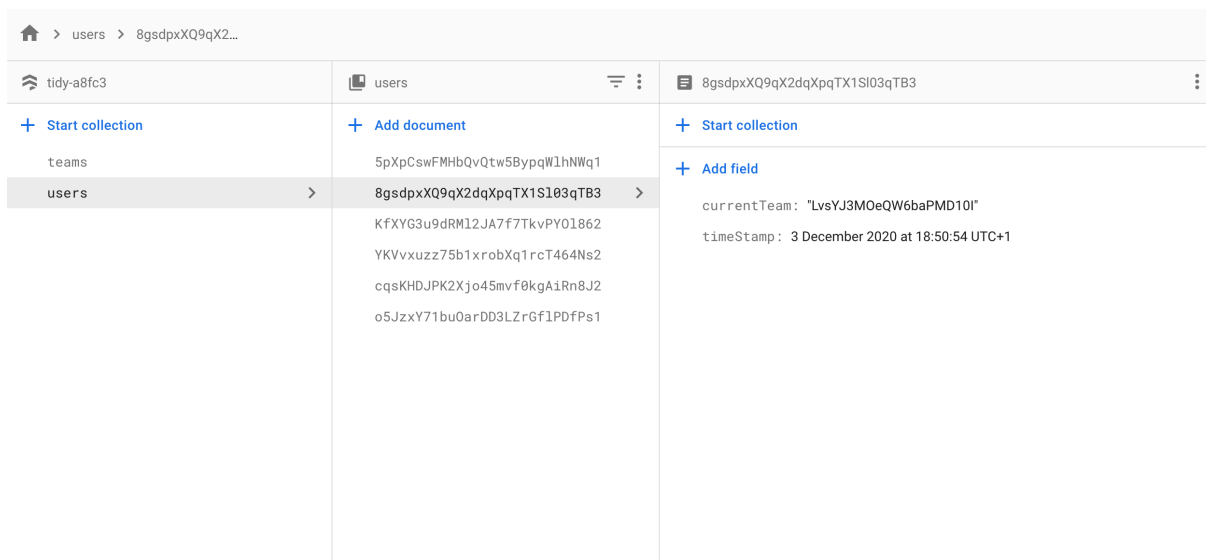


As you can see, there are two main collections, namely teams and users. Every XX-ID (e.g. teamID, userID, ...) are one of the documents in its parent collection. When a user signs in, an individual document with its unique userID will be created in the users collection if it does not exist. And if its teamID field is None (which means it has not joined any team), then user will be asked to join an existing team or create a new team. Either of them will bind a teamID to this user, meanwhile a new membership will be created based on its userID in the sub-collection of teams, which will be used to store user's future activities. More importantly, keeping all userIDs in the teamID document enables secure access control of reading and writing data, which is very handy to implement access rule with Cloud Firestore Security Rule, for example. In addition to that, the data type of area clean job and item clean job is same, which is really convenient when we want to record work done in user's activity meanwhile, it can also be easily extended to even more detailed job if needed.

8. Screenshot:



9. **Gains:** Once the design of data model is done, implementing different fragments to communicate with firestore database is fairly easy. Even though the firestore is really fast, there is still some latency when communicate with database. It is quite challenging to try to improve the performance, e.g. hide the latency by making users to do some extra activities. I also found out the timestamp is not always available even the documents seems to be created in the firestore console. After some investigation, it turns out that there is two events when will add documents. The first initial event confirms the document write in the local cache. At this point the timestamp is null because the server has not set it yet. Only the second event where the timestamp has been set by the server and the clients is able to observe the change. It is quite interesting to have a glimpse of how the firestore database really works.
10. **Debug story:** Implementing correctly to detect and manage the case that a user has no team. Obviously if the user has a team, everything is easy, just load the data and no extra work needed. However, if the user has no team, then the user will be asked to join or create a team in a new fragment. In order to make it works, everything has to collaborate with each other. The data model of teams and users must be well structured. The communication channel via view model must be set up correctly. It is really hard to make the homefragment wait patiently until all the necessary data (like userID, teamID) is ready, without producing any NullPointerException. In addition to that, submitlist() to the adapter fails to detect the change, even the diff function is provided. Therefore I have to call notifyDataSetChanged() in some cases.
11. **Build and run:** just build and run
12. **Firestore:** please refer to 7.Data Model screenshots from firestore console as follows



<div> <div> <div>🏠</div> <div>></div> <div>teams</div> <div>></div> <div>LvsYJ3MOeQW...</div> </div> </div>		
<div> <div>📁</div> <div>tidy-a8fc3</div> </div>	<div> <div>📁</div> <div>teams</div> <div>⌵</div> <div>⋮</div> </div>	<div> <div>📁</div> <div>LvsYJ3MOeQW6baPMD10I</div> <div>⋮</div> </div>
<div> <div>+ Start collection</div> <div> <div>teams</div> <div>></div> </div> <div>users</div> </div>	<div> <div>+ Add document</div> <div> <div>DdzP8IVB1EdU7ufTBdSs</div> <div>LvsYJ3MOeQW6baPMD10I</div> <div>></div> <div>reatTyLgNIISpvc6Q111</div> </div> </div>	<div> <div>+ Start collection</div> <div> <div>areaCleanJob</div> <div>membership</div> </div> <div> <div>+ Add field</div> <div> <div>name: "Mike"</div> <div>rowID: "LvsYJ3MOeQW6baPMD10I"</div> <div>timeStamp: 3 December 2020 at 18:49:59 UTC+1</div> </div> </div> </div>

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<div> <div>📁</div> <div>LvsYJ3MOeQW6baPMD10I</div> <div>⋮</div> </div>	<div> <div>📁</div> <div>membership</div> <div>⌵</div> <div>⋮</div> </div>	<div> <div>📁</div> <div>KfXYG3u9dRMI2JA7f7TkvpY0I862</div> <div>⋮</div> </div>
<div> <div>+ Start collection</div> <div> <div>areaCleanJob</div> <div>membership</div> <div>></div> </div> </div>	<div> <div>+ Add document</div> <div> <div>8gsdpxXQ9qX2dqXpqTX1S103qTB3</div> <div>KfXYG3u9dRMI2JA7f7TkvpY0I862</div> <div>></div> </div> </div>	<div> <div>+ Start collection</div> <div> <div>+ Add field</div> <div> <div>name: "Mike"</div> <div>score: 0</div> <div>timeStamp: 3 December 2020 at 18:49:59 UTC+1</div> </div> </div> </div>
<div> <div>+ Add field</div> <div> <div>name: "Mike"</div> <div>rowID: "LvsYJ3MOeQW6baPMD10I"</div> <div>timeStamp: 3 December 2020 at 18:49:59 UTC+1</div> </div> </div>		

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<div> <div>📁</div> <div>DdzP8iVB1EdU7uftBdSs</div> <div>⋮</div> </div>	<div> <div>📁</div> <div>areaCleanJob</div> <div>☰</div> <div>⋮</div> </div>	<div> <div>📁</div> <div>4uXnaHUPFocj00ogHWia</div> <div>⋮</div> </div>
<div> <div>+ Start collection</div> <div>areaCleanJob ></div> <div>membership</div> </div>	<div> <div>+ Add document</div> <div>0TDx84YR9sgsfnhANN5D</div> <div>4uXnaHUPFocj00ogHWia ></div> <div>CRvDB9LD7hEng2jJtnne</div> <div>Mwnc2YPaz175qbQs68Gu</div> <div>cxFUX0gxqL1L8fpyY6tx</div> <div>o3XC70BMAGwG3KK2438G</div> <div>rBzWv0lwb888WTdiyM81</div> <div>sQuY2a1r94CvxfxMDjrK</div> </div>	<div> <div>+ Start collection</div> <div>itemCleanJob</div> </div>
<div> <div>+ Add field</div> <div>name: "Shi"</div> <div>rowID: "DdzP8iVB1EdU7uftBdSs"</div> <div>timeStamp: 3 December 2020 at 00:14:57 UTC+1</div> </div>		<div> <div>+ Add field</div> <div>frequency: 5</div> <div>jobTitle: "Bathroom"</div> <div>lastUpdateTime: 3 December 2020 at 11:34:34 UTC+1</div> <div>responsiblePerson: null</div> <div>rowID: "4uXnaHUPFocj00ogHWia"</div> <div>score: 20</div> <div>timeStamp: 3 December 2020 at 01:24:34 UTC+1</div> </div>

<div> <div> <div>🏠</div> <div>></div> <div>...</div> <div>></div> <div>areaCleanJob</div> <div>></div> <div>4uXnaHUPFocj0...</div> <div>></div> <div>itemCleanJob</div> <div>></div> <div>IfrsYsSXun7Jm...</div> </div> </div>		
<div> <div>📁</div> <div>4uXnaHUPFocj00ogHWia</div> <div>⋮</div> </div>	<div> <div>📁</div> <div>itemCleanJob</div> <div>☰</div> <div>⋮</div> </div>	<div> <div>📁</div> <div>IfrsYsSXun7Jm7KoBYby</div> <div>⋮</div> </div>
<div> <div>+ Start collection</div> <div>itemCleanJob ></div> </div>	<div> <div>+ Add document</div> <div>IfrsYsSXun7Jm7KoBYby ></div> <div>RoZqQhBu53UJlpSuN6K0</div> <div>XguxoHzv1C94rvQ8oYwJ</div> <div>XwmG7SDk3PFgMWRHCOju</div> </div>	<div> <div>+ Start collection</div> </div>
<div> <div>+ Add field</div> <div>frequency: 5</div> <div>jobTitle: "Bathroom"</div> <div>lastUpdateTime: 3 December 2020 at 11:34:34 UTC+1</div> <div>responsiblePerson: null</div> <div>rowID: "4uXnaHUPFocj00ogHWia"</div> <div>score: 20</div> <div>timeStamp: 3 December 2020 at 01:24:34 UTC+1</div> </div>		<div> <div>+ Add field</div> <div>frequency: 10</div> <div>jobTitle: "Disinfect bathtub"</div> <div>lastUpdateTime: 3 December 2020 at 21:26:05 UTC+1</div> <div>responsiblePerson: null</div> <div>rowID: "IfrsYsSXun7Jm7KoBYby"</div> <div>score: 10</div> <div>timeStamp: 3 December 2020 at 21:26:06 UTC+1</div> </div>

13. Cloc report: total lines of authorship

Kotlin	2466
XML	1143
Sum	3609

File	blank	comment	code	authorship	note
app/src/main/java/com/utap/tidy/ui/MainViewModel.kt	92	21	622	622	
app/src/main/java/com/utap/tidy/ui/HomeFragment.kt	27	9	226	200	initTouchHelper()
app/src/main/res/drawable/ic_launcher_background.xml	0	0	170	0	default
app/src/main/java/com/utap/tidy/ui/AreaRowAdapter.kt	19	17	165	165	
app/src/main/java/com/utap/tidy/ui/item/ItemRowAdapter.kt	20	30	153	153	
app/src/main/java/com/utap/tidy/ui/item/ItemFrag.kt	15	7	116	116	
app/src/main/java/com/utap/tidy/ui/ScoreFrag.kt	12	80	103	103	
app/src/main/java/com/utap/tidy/auth/SearchTeamFragment.kt	16	5	99	99	
app/src/main/res/layout/fragment_area_finish.xml	1	0	92	92	
app/src/main/java/com/utap/tidy/ui/EditAreaNameFrag.kt	9	2	84	84	
app/src/main/java/com/utap/tidy/ui/AddAreaNameFrag.kt	10	2	81	81	
app/src/main/java/com/utap/tidy/auth/AuthInitActivity.kt	5	12	79	0	AuthInitActivity
app/src/main/java/com/utap/tidy/ui/item/AddItemNameFrag.kt	10	2	79	79	
app/src/main/res/layout/fragment_team_select.xml	1	0	79	79	
app/src/main/java/com/utap/tidy/MainActivity.kt	14	9	69	60	onCreate()
app/src/main/java/com/utap/tidy/ui/item/AddItemFreqFrag.kt	9	1	69	69	
app/src/main/java/com/utap/tidy/ui/AddAreaFreqFrag.kt	9	1	68	8	
app/src/main/res/layout/fragment_add_area_effort.xml	1	0	68	68	
app/src/main/res/layout/fragment_add_area_freq.xml	1	0	68	68	
app/src/main/java/com/utap/tidy/ui/EditAreaFreqFrag.kt	10	1	67	67	
app/src/main/res/layout/fragment_new_user.xml	1	0	66	66	
app/src/main/java/com/utap/tidy/ui/EditAreaEffortFrag.kt	7	2	62	62	
app/src/main/java/com/utap/tidy/ui/TeamRowAdapter.kt	12	5	62	62	
app/src/main/java/com/utap/tidy/ui/item/FinishItemFrag.kt	9	2	61	61	
app/src/main/java/com/utap/tidy/ui/FinishAreaFrag.kt	10	2	60	60	
app/src/main/java/com/utap/tidy/ui/item/AddItemEffortFrag.kt	9	2	60	60	
app/src/main/java/com/utap/tidy/ui/AddAreaEffortFrag.kt	9	2	59	59	
app/src/main/java/com/utap/tidy/auth/SelectTeamFragment.kt	10	1	52	52	
app/src/main/java/com/utap/tidy/auth/NewUserFragment.kt	12	0	51	51	
app/src/main/java/com/utap/tidy/auth/NewNameFragment.kt	8	1	48	48	
app/src/main/res/layout/row_area.xml	1	2	48	48	
app/src/main/res/layout/action_bar.xml	2	0	44	44	
app/src/main/res/layout/fragment_rv.xml	1	0	39	39	
app/src/main/res/layout/row_team.xml	1	2	38	38	
app/src/main/res/layout/fragment_add_area_name.xml	1	0	36	36	
app/src/main/res/layout/fragment_new_name.xml	0	0	32	32	
app/src/main/res/drawable-v24/ic_launcher_foreground.xml	0	0	30	0	default
app/src/main/res/layout/fragment_rv_item.xml	1	0	24	24	
app/src/main/res/layout/activity_main.xml	6	1	23	23	
app/src/main/res/values/styles.xml	3	4	23	10	use application theme
app/src/main/AndroidManifest.xml	3	0	20	0	default
app/src/main/res/layout/content_main.xml	2	0	20	20	
app/src/main/res/layout/item_autocomplete.xml	0	0	19	19	
app/src/main/java/com/utap/tidy/auth/FirestoreAuthLiveData.kt	4	0	18	0	FirestoreAuthLiveData
app/src/main/res/drawable/ic_due_105_.xml	0	0	18	18	
app/src/main/res/layout/bar_chart.xml	3	0	18	18	
app/src/main/res/values/colors.xml	2	2	18	18	
app/src/main/res/drawable/ic_due_105.xml	0	0	17	17	
app/src/main/res/drawable/ic_join.xml	0	0	17	17	
app/src/main/res/drawable/ic_join_20dp.xml	0	0	17	17	
app/src/main/res/drawable/ic_plus_20dp.xml	0	0	17	17	
app/src/main/res/drawable/ic_plus_60dp.xml	0	0	17	17	
app/src/main/java/com/utap/tidy/data/CleanJob.kt	2	1	13	13	
app/src/main/res/drawable/ic_check_20dp.xml	0	0	13	13	
app/src/main/res/drawable/ic_check_60dp.xml	0	0	13	13	
app/src/main/res/drawable/ic_close_60dp.xml	0	0	13	13	
app/src/main/res/drawable/ic_due_10.xml	0	0	13	13	
app/src/main/res/drawable/ic_due_100.xml	0	0	13	13	
app/src/main/res/drawable/ic_due_110.xml	0	0	13	13	
app/src/main/res/drawable/ic_due_120.xml	0	0	13	13	

app/src/main/res/drawable/ic_due_130.xml	0	0	13	13
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app/src/main/res/drawable/ic_due_160.xml	0	0	13	13
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app/src/main/res/drawable/ic_due_50.xml	0	0	13	13
app/src/main/res/drawable/ic_due_60.xml	0	0	13	13
app/src/main/res/drawable/ic_due_70.xml	0	0	13	13
app/src/main/res/drawable/ic_due_80.xml	0	0	13	13
app/src/main/res/drawable/ic_due_90.xml	0	0	13	13
app/src/main/res/drawable/ic_start_nice.xml	0	0	13	13
app/src/main/res/values-night/themes.xml	0	5	11	13
app/src/main/res/values/themes.xml	0	5	11	11
app/src/main/java/com/utap/tidy/data/Membership.kt	2	0	9	9
app/src/main/java/com/utap/tidy/data/Team.kt	3	0	9	9
app/src/main/java/com/utap/tidy/data/User.kt	2	0	8	8
app/src/main/res/drawable/divider.xml	1	0	8	8
app/src/main/res/mipmap-anydpi-v26/ic_launcher_round.xml	0	0	5	5
app/src/main/java/com/utap/tidy/test/Repository.kt	4	23	4	4
app/src/main/res/values/strings.xml	0	0	3	3
<hr/>				
SUM:	412	261	4032	3609
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Language	files	blank	comment	code	Language	authorship
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Kotlin	30	380	240	2656	Kotlin	2466
XML	52	32	21	1376	XML	1143
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SUM:	82	412	261	4032	sum	3609
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