Dhirubhai Ambani University
Technology

Formerly DA-IICT

Software Engineering
Group 27
Project Title : Connect Sphere
Mutation Testing
Professor: Saurabh Tiwari

1. Introduction:

Mutation Testing was performed on the Connect-Sphere social media application to assess the existing unit test suite using the Stryker Mutator framework.

Aim : To evaluate strength and effectiveness of the current unit test(measured by Mutation Score).

By identifying gaps in testing coverage and subsequently adding new test cases to kill all surviving mutants, thereby increasing application overall test quality and stability.

Tools Used:

- Stryker : Mutation Testing
- Vitest : Unit Testing

Overall Mutation Score Analysis:

Mutation Score Calculation:

$$\textbf{Mutation Score (of Covered)} = \frac{Total\ Killed}{Total\ Killed + Total\ Survived} \times \textbf{100}$$

All files 🔍

| 5766 | | | | | | | 2898 | | | 693 |

File / Directory ⓘ	Mutation Score		Killed	Survived	Timeout	No coverage	Ignored	Runtime errors	Compile errors	Detected	Undetected	Total
	Of total	Of covered										
📁 All files	61.62	66.55	5766	2898	0	693	172	25	0	5766	3591	9554
📁 app	77.81	79.55	1529	393	0	43	14	0	0	1529	436	1979
📁 components	55.00	60.87	3693	2374	0	647	148	25	0	3693	3021	6887
📁 hooks	79.27	80.15	218	54	0	3	3	0	0	218	57	278
📁 lib	80.89	80.89	326	77	0	0	7	0	0	326	77	410

Mutation Score $= \dfrac{5766}{5766 + 2898} \times 100 = 66.55\%$

App:

File / Directory	Mutation Score		Killed	Survived	Timeout	No coverage	Ignored	Runtime errors	Compile errors	Detected	Undetected	Total
	Of total	Of covered										
📁 All files	77.76	79.50	1528	394	0	43	14	0	0	1528	437	1979
📁 api	77.35	79.56	1199	308	0	43	14	0	0	1199	351	1564
TS communities/actions.ts	79.28	79.28	329	86	0	0	0	0	0	329	86	415

Mutation Score = $\dfrac{1528}{1528 + 394} \times 100 = 79.50\%$

Lib:

File / Directory	Mutation Score		Killed	Survived	Timeout	No coverage	Ignored	Runtime errors	Compile errors	Detected	Undetected	Total
	Of total	Of covered										
📁 All files	80.80	80.80	362	86	0	0	7	0	0	362	86	455
TS messages.ts	76.67	76.67	92	28	0	0	0	0	0	92	28	120
TS notifications.ts	100.00	100.00	68	0	0	0	0	0	0	68	0	68
TS post-data.ts	80.00	80.00	36	9	0	0	0	0	0	36	9	45
TS utils.ts	100.00	100.00	14	0	0	0	2	0	0	14	0	16
TS verification.ts	75.62	75.62	152	49	0	0	5	0	0	152	49	206

Mutation Score = $\dfrac{362}{362 + 86} \times 100 = 80.80\%$

Hooks:

File / Directory	Mutation Score		Killed	Survived	Timeout	No coverage	Ignored	Runtime errors	Compile errors	Detected	Undetected	Total
	Of total	Of covered										
📁 All files	80.00	80.88	220	52	0	3	3	0	0	220	55	278
TS use-mobile.tsx	84.21	84.21	16	3	0	0	0	0	0	16	3	19
TS use-realtime.ts	97.73	97.73	43	1	0	0	0	0	0	43	1	44
TS use-toast.ts	81.52	84.27	75	14	0	3	3	0	0	75	17	95
TS use-user.ts	71.67	71.67	86	34	0	0	0	0	0	86	34	120

Mutation Score $= \dfrac{220}{220 + 52} \times 100 = 80.88\%$

Components:

File / Directory	Mutation Score		Killed	Survived	Timeout	No coverage	Ignored	Runtime errors	Compile errors	Detected	Undetected	Total
	Of total	Of covered										
🗀 All files	55.13	60.90	3764	2417	0	647	148	27	0	3764	3064	7003
🗀 auth	35.21	40.76	75	109	0	29	41	0	0	75	138	254
🗀 communities	64.75	68.01	812	382	0	60	19	1	0	812	442	1274
🗀 feed	59.50	65.16	993	531	0	145	0	14	0	993	676	1683
🗀 messages	39.03	45.90	605	713	0	232	46	3	0	605	945	1599
TS moderation/moderator-dashboard.tsx	44.22	48.86	172	180	0	37	18	1	0	172	217	408
🗀 notifications	41.08	59.67	145	98	0	110	1	0	0	145	208	354
TS privacy/privacy-settings.tsx	71.05	71.05	81	33	0	0	0	2	0	81	33	116
🗀 profile	68.75	70.49	473	198	0	17	2	3	0	473	215	693
TS search/search-bar.tsx	70.76	70.76	167	69	0	0	0	2	0	167	69	238
🗀 settings	90.73	93.84	137	9	0	5	0	0	0	137	14	151
TS stories/StoryUploadForm.tsx	48.72	50.00	19	19	0	1	0	1	0	19	20	40
TS app-header.tsx	52.94	61.36	27	17	0	7	0	0	0	27	24	51
TS app-shell.tsx	100.00	100.00	1	0	0	0	0	0	0	1	0	1

Mutation Score $= \dfrac{3764}{3764 + 2474} \times 100 = 60.90\%$