



D5.6C TAIBOM Functional Testing

Test Report

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Introduction

This report contains a set of functional tests which were performed against TAIBOM. This provides the basis for future functional testing, but was not designed to be a full set of boundary tests, acceptance tests or against a fixed specification. As the TAIBOM software develops further, a more formalised approach will be taken.

Input Option Testing

The following set of tests were used to test basic input options for TAIBOM.

1. Check TAIBOM version	
Test Executed	taibom -V
Output	0.0.1
Passes as expected	

2. Check TAIBOM invalid option	
Test Executed	taibom -d
Output	error: unknown option '-d'
Fails as expected	

[illegible]

4. Invalid flag should fail	
Test Executed	taibom --invalid-flag
Output	error: unknown option
Fails as expected	



5. Running TAIBOM with no arguments

Test Executed	taibom
Output	"Usage: SDK for creating & verifying TAIBOMS [options] [command]"

Fails as expected

6. Non-existent file should fail

Test Executed	taibom nonexistentfile.txt
Output	error: unknown command 'nonexistentfile.txt'

Fails as expected

7. Special character input test

Test Executed	bash -c "echo -n ' ' taibom"
Output	Usage: SDK for creating & verifying TAIBOMS [options] [command]

Fails as expected

8. Passing a directory instead of a file

Test Executed	mkdir -p test_directory taibom test_directory rmdir test_directory
Output	error: unknown command 'test_directory'

Fails as expected

9. Run TAIBOM in a subshell

Test Executed	bash -c "(taibom -V)"
Output	0.0.1

Test passes with taibom running in a subshell



10. Run TAIBOM in a subshell

Test Executed	taibom -V &
Output	0.0.1
Passes running as a background task	

11. Generate an identity with special characters

Test Executed	taibom generate-identity " <i>Test Name</i> " " <i>test@example.com</i> " " <i>Developer</i> "
Output	Invalid email format.
Fails as expected	

12. Generate an identity using environment variables

Test Executed	NAME="Test Name" EMAIL="test@tester.com" ROLE="Developer" taibom generate-identity "\$NAME" "\$EMAIL" "\$ROLE"
Output	VC Signed data has been written to /home/ch/.taibom/test@tester.com -identity.json VC Signed data has been written to /home/ch/nqminds-taibom-sdk- 0.0.1/package/TAIBOM-identity- c9f15a05-11f8-4ba6-b5c0- b61fccbfa139.json
Passes as expected	



Scale Tests Against Larger Datasets

Tests were performed with varying dataset sizes to measure TAIBOM performance. This approach was used to assess how well TAIBOM adapts to changes in data volume to test the scalability of the software.

The tests were conducted on a PC with minimal background applications and services running to ensure that the virtual machine (VM) had maximum possible access to system resources such as CPU, memory, and disk I/O. This setup was intended to eliminate any potential interference or performance bottlenecks caused by other processes, so providing a more accurate and consistent measurement of the VM's performance.

Methodology:

These will be measured with the following time measurements:

Real time: Total elapsed time from start to finish, including waiting for resources.

User time: CPU time spent executing user-space code.

System time: CPU time spent handling system calls (e.g., file I/O, memory management).

Here are the specs of the virtual machine we're running the tests on:

Oracle VirtualBox

Ubuntu 24.04.2 LTS

11.5 GiB Disk

Intel® Core™ i9-14900HX × 8

8GB Ram

Each test will be executed 3 time to test consistency.



13. 1GB dataset signature generation (tested 3 times)

Test Executed

file count 41,916 (Total file size 1.2GB)

```
time taibom data-taibom  
"XXX@copperhorse.co.uk"  
1GB_Dataset
```

Output

```
Test 1  
real 0m17.569s  
user 0m0.829s  
sys 0m7.266s  
Test 2  
real 0m1.139s  
user 0m0.831s  
sys 0m0.499s  
Test 3  
real 0m1.207s  
user 0m0.779s  
sys 0m0.606s
```

First test may be affected by cold cache, but subsequent tests are similar

14. 2GB dataset signature generation (tested 3 times)

Test Executed

file count 41,916 (Total file size 1.2GB)

```
time taibom data-taibom  
"XXX@copperhorse.co.uk"  
2GB_Dataset
```

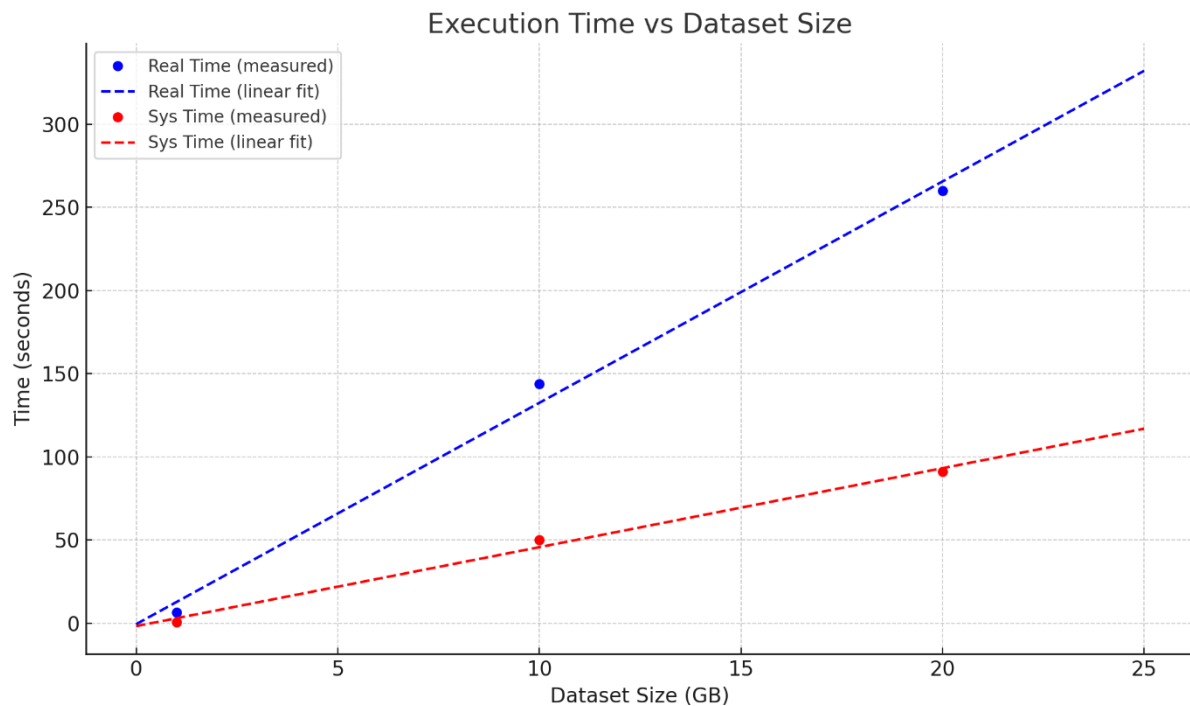
Output

```
Test 1  
real 2m29.613s  
user 0m8.577s  
sys 0m52.072s  
Test 2  
real 2m21.091s  
user 0m8.605s  
sys 0m49.584s  
Test 3  
real 2m22.116s  
user 0m8.188s  
sys 0m49.122s
```

Passes as expected



15. 10GB dataset signature generation (tested 3 times)	
Test Executed	File count 754,504 (Total file size 21.2GB) time taibom data-taibom "XXX@copperhorse.co.uk" 21.2GB_Dataset
Output	Test 1 real 4m34.786s user 0m14.602s sys 1m38.916s Test 2 real 4m11.930s user 0m17.881s sys 1m25.404s Test 3 real 4m12.849s user 0m15.284s sys 1m29.574s
Passes as expected – a dataset of 20GB takes approximately twice as long to sign as a 10GB dataset	



This chart, an extrapolation of the dataset execution time test results, demonstrates how real and sys execution times scale with dataset size:

- The blue line represents real (wall-clock) time and scales fairly linearly from 10GB to 20GB.
- The red line represents system (kernel) time, also showing linear growth.
- The 1GB point appears below the linear trend - suggesting that small datasets benefit from in-memory processing or caching.



Based on these calculations we can estimate the execution time for TAIBOM to sign larger datasets:

Dataset Size	Estimated Real Time	Estimated Sys Time
30 GB	398.5 seconds (6m39s)	140.6 seconds (2m20s)
50 GB	664.6 seconds (11m5s)	235.6 seconds (3m56s)
100 GB	1329.9 seconds (22m10s)	473.0 seconds (7m53s)
200 GB	2660.3 seconds (44m20s)	947.8 seconds (15m48s)
500 GB	6651.8 seconds (1h50m)	2372.2 seconds (39m32s)
1024 GB (1TB)	13623.5 seconds (3h47m)	4860.1 seconds (1h21m)

For reference, in the ‘Datasets for Large Language Models’ paper (2024)¹, “a comprehensive review of the existing available dataset resources is also provided, including statistics from 444 datasets, covering 8 language categories and spanning 32 domains. Information from 20 dimensions is incorporated into the dataset statistics. The total data size surveyed surpasses 774.5 TB for pre-training corpora and 700M instances for other datasets.”

A very basic calculation (not considering multi-threading / multi-core processing) gives an approximate execution time of 10,551,400 seconds (2930.944 hours / 122.123 days) for the 774.5 TB pre-training LLM datasets.

¹ <https://arxiv.org/abs/2402.18041>



Generation of User Identity Testing

These functional tests are used to test the TAIBOM generate-identity option. The test check inputs and outputs to confirm the correct boundary checks are in place to correctly generate user identities. This will also check that the system properly processes and stores user details, including name, email, and role and that email formats are valid, preventing invalid entries.

16. Generate identity one argument	
Test Executed	<code>taibom generate-identity "Test Name"</code>
Output	<code>error: missing required argument 'email'</code>
Test fails as expected	

17. Generate identity two argument	
Test Executed	<code>taibom generate-identity "Test Name" "Test@tester.com"</code>
Output	<code>error: missing required argument 'role'</code>
Test fails as expected	

18. Generate identity with valid arguments	
Test Executed	<code>taibom generate-identity "Test Name" "Test@tester.com" "Developer"</code>
Output	<code>"VC Signed data has been written to /home/ch/.taibom/Test@tester.com-identity.json VC Signed data has been written to /home/ch/nqminds-taibom-sdk-0.0.1/package/TAIBOM-identity-d35267ee-be18-458b-90a3-e56614c67708.json"</code>
Test runs correctly	



19. Generate identity empty arguments

Test Executed	taibom generate-identity "" ""
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Output	Invalid email format.
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Test fails as expected

20. Generate identity spaces as arguments

Test Executed	taibom generate-identity "Test Name" "invalid-email" "Developer"
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Output	Invalid email format
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Test fails as expected

21. Generate identity long name (2000 characters)

Test Executed	taibom generate-identity 7LXC7l1lVYj9ju8b3fQBHyK0QhRee3f4S 8rveOqp5FXwW5pqa9FmkYj4HytFeROQ9 vJ3OuUk0QHa0HHUvxIYdgn2wfipN364V f73tUZ9CNM23RMw8wGEfPeP5fE6cBUb0 pQHQdsm4mAphj8Jc09eqNtCCWGHSHby5 3o9cuDGel0ZZRCKMkt7PYhAlVuM1E3g3 pAtdsvUESKb3UALKpCboPancq8PJzNIe 1F2g4Te51KnZCt3FLYF9gwPs8HrKcDw5 I32ArKT00kSAyy7nFj2NtG8ipEivrko4 6tEqqWW1HLolKs8XquxePWvOFG8At6Gq BXJGedKSnfLwJQUxSstJhm803kj3CmDz te6rEMKIFTlm5DWeT49K3pnTTQNx9LZz 0TQA7HZyznBSw3CmPcTUoQP4L3neruBp RgsymBRw6GzBwC3xk0QZjtBysPi63TnP DU6wRropNTQ19y2eDTbdEa9cBBYPUUA0 0aMvJrgGkaIONj3PD7LXC7l1lVYj9ju8b 3fQBHyK0QhRee3f4S8rveOqp5FXwW5pq a9FmkYj4HytFeROQ9vJ3OuUk0QHa0HHU vxIYdgn2wfipN364Vf73tUZ9CNM23RMw 8wGEfPeP5fE6cBUb0pQHQdsm4mAphj8J c09eqNtCCWGHSHby53o9cuDGel0ZZRCK Mkt7PYhAlVuM1E3g3pAtdsvUESKb3UAL KpCboPancq8PJzNIe1F2g4Te51KnZCt3 FLYF9gwPs8HrKcDw5I32ArKT00kSAyy7 nFj2NtG8ipEivrko46tEqqWW1HLolKs8
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	<pre>XquxePWvOFG8At6GqBXJGedKSnfLwJQU xSstJhm803kj3CmDzte6rEMKIFTlm5DW eT49K3pnTTQNx9LZz0TQA7HZyznBSw3C mPcTUoQP4L3neruBpRgsymBRw6GzBwC3 xk0QZjtBysPi63TnPDU6wRropNTQ19y2 eDTbdEa9cBBYPUUA00aMvJrgGka7LXC7 1lVYj9ju8b3fQBHyK0QhRee3f4S8rveO qp5FXwW5pqa9FmkYj4HytFeROQ9vJ3Ou Uk0QHa0HHUvxIYdgn2wfipN364Vf73tU Z9CNM23RMw8wGEfPeP5fE6cBUb0pQHQd sm4mAphj8JcO9eqNtCCWGHSHby53o9cu DGel0ZZRCkMKt7PYhAlVuM1E3g3pAtds vUESKb3UALKpCboPancq8PJzN1e1F2g4 Te51KnZCt3FLYF9gwPs8HrKcDw5I32Ar KT0OkSAyy7nFj2NtG8ipEIvrkO46tEqq WW1HLolKs8XquxePWvOFG8At6GqBXJGe dKSnfLwJQUxSstJhm803kj3CmDzte6rE MKIFTlm5DWeT49K3pnTTQNx9LZz0TQA7 HZyznBSw3CmPcTUoQP4L3neruBpRgsym BRw6GzBwC3xk0QZjtBysPi63TnPDU6wR ropNTQ19y2eDTbdEa9cBBYPUUA00aMvJ rgGkaIONj3PD8mN7LXC71lVYj9ju8b3f QBHyK0QhRee3f4S8rveOqp5FXwW5pqa9 FmkYj4HytFeROQ9vJ3OuUk0QHa0HHUvx IYdgn2wfipN364Vf73tUZ9CNM23RMw8w GEfPeP5fE6cBUb0pQHQdsm4mAphj8JcO 9eqNtCCWGHSHby53o9cuDGel0ZZRCkMK t7PYhAlVuM1E3g3pAtdsvUESKb3UALKp CboPancq8PJzN1e1F2g4Te51KnZCt3FL YF9gwPs8HrKcDw5I32ArKT0OkSAyy7nF j2NtG8ipEIvrkO46tEqqWW1HLolKs8Xq uxePWvOFG8At6GqBXJGedKSnfLwJQUxS stJhm803kj3CmDzte6rEMKIFTlm5DWeT 49K3pnTTQNx9LZz0TQA7HZyznBSw3CmP cTUoQP4L3neruBpRgsymBRw6GzBwC3xk 0QZjtBysPi63TnPDU6wRropNTQ19y2eD TbdEa9cBBYPUUA00aMvJrgGkaIONj3PD 8mNIONj3PD8mN8mN "Test@tester.com" "Developer"</pre>
Output	<pre>VC Signed data has been written to /home/ch/.taibom/Test@tester.com -identity.json VC Signed data has been written to /home/ch/nqminds-taibom-sdk- 0.0.1/package/TAIBOM-identity-</pre>



	87269c33-823d-4299-8082-b355c6c7bb72.json
Test runs correctly but should include an upper character limit	

22. Generate long email address (2000 characters)

Test Executed	taibom generate-identity "Tester" "7LXC711VYj9ju8b3fQBHyK0QhRee3f4S8rveOqp5FXwW5pqa9FmkYj4HytFeROQ9vJ3OuUk0QHa0HHUvxIYdgn2wfipN364Vf73tUZ9CNM23RMw8wGEfPeP5fE6cBUb0pQHQdsm4mAphj8JcO9eqNtCCWGHSHby53o9cuDGel0ZZRCkMKt7PYhAlVuM1E3g3pAtdsvUESKb3UALKpCboPancq8PJzNIe1F2g4Te51KnZCt3FLYF9gwPs8HrKcDw5I32ArKT0OkSAyy7nFj2NtG8ipEIvrkO46tEqqWW1HLolKs8XquxePWvOFG8At6GqBXJGedKSnfLwJQUxSstJhm803kj3CmDzte6rEMKIIFTlm5DWeT49K3pnTTQNx9LZz0TQA7HZyznBSw3CmPcTUoQP4L3neruBpRgsymBRw6GzBwC3xk0QZjtBysPi63TnPDU6wRropNTQ19y2eDTbdEa9cBBYPUUA00aMvJrgGkaIONj3PD7LXC711VYj9ju8b3fQBHyK0QhRee3f4S8rveOqp5FXwW5pqa9FmkYj4HytFeROQ9vJ3OuUk0QHa0HHUvxIYdgn2wfipN364Vf73tUZ9CNM23RMw8wGEfPeP5fE6cBUb0pQHQdsm4mAphj8JcO9eqNtCCWGHSHby53o9cuDGel0ZZRCkMKt7PYhAlVuM1E3g3pAtdsvUESKb3UALKpCboPancq8PJzNIe1F2g4Te51KnZCt3FLYF9gwPs8HrKcDw5I32ArKT0OkSAyy7nFj2NtG8ipEIvrkO46tEqqWW1HLolKs8XquxePWvOFG8At6GqBXJGedKSnfLwJQUxSstJhm803kj3CmDzte6rEMKIIFTlm5DWeT49K3pnTTQNx9LZz0TQA7HZyznBSw3CmPcTUoQP4L3neruBpRgsymBRw6GzBwC3xk0QZjtBysPi63TnPDU6wRropNTQ19y2eDTbdEa9cBBYPUUA00aMvJrgGka7LXC711VYj9ju8b3fQBHyK0QhRee3f4S8rveOqp5FXwW5pqa9FmkYj4HytFeROQ9vJ3OuUk0QHa0HHUvxIYdgn2wfipN364Vf73tUZ9CNM23RMw8wGEfPeP5fE6cBUb0pQHQdsm4mAphj8JcO9eqNtCCWGHSHby53o9cuDGel0ZZRCkMKt7PYhAlVuM1E3g3pAtdsvUESKb3UALKpCboPancq8PJzNIe1F2g
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	4Te51KnZCt3FLYF9gwPs8HrKcDw5I32ArKT0OkSAyy7nFj2NtG8ipEIvrkO46tEqqWW1HLolKs8XquxePWvOFG8At6GqBXJGedKSnfLwJQUxSstJhm803kj3CmDzte6rEMKIFTlm5DWeT49K3pnTTQNx9LZz0TQA7HZyznBSw3CmPcTUoQP4L3neruBpRgsymBRw6GzBwC3xk0QZjtBysPi63TnPDU6wRropNTQ19y2eDTbdEa9cBBYPUUA00aMvJrgGkaIONj3PD8mN7LXC711VYj9ju8b3fQBHyK0QhRee3f4S8rveOqp5FXwW5pqa9FmkYj4HytFeROQ9vJ3OuUk0QHa0HHUvxIYdgn2wfipN364Vf73tUZ9CNM23RMw8wGEfPeP5fE6cBUb0pQHQdsm4mAphj8JcO9eqNtCCWGHSHby53o9cuDGel0ZZRckMKt7PYhAlVuM1E3g3pAtdsvUESKb3UALKpCboPancq8PJzNIe1F2g4Te51KnZCt3FLYF9gwPs8HrKcDw5I32ArKT0OkSAyy7nFj2NtG8ipEIvrkO46tEqqWW1HLolKs8XquxePWvOFG8At6GqBXJGedKSnfLwJQUxSstJhm803kj3CmDzte6rEMKIFTlm5DWeT49K3pnTTQNx9LZz0TQA7HZyznBSw3CmPcTUoQP4L3neruBpRgsymBRw6GzBwC3xk0QZjtBysPi63TnPDU6wRropNTQ19y2eDTbdEa9cBBYPUUA00aMvJrgGkaIONj3PD8mNIONj3PD8mN8mN@tester.com" "Developer"
Output	Error: ENAMETOOLONG: name too long, mkdir '/home/ch/.taibom... errno: -36, code: 'ENAMETOOLONG', syscall: 'mkdir'
Test fails as expected (in node.js)	

23. Generate long role (2000 characters)

Test Executed	taibom generate-identity "Tester" "test@tester.com" "7LXC711VYj9ju8b3fQBHyK0QhRee3f4S8rveOqp5FXwW5pqa9FmkYj4HytFeROQ9vJ3OuUk0QHa0HHUvxIYdgn2wfipN364Vf73tUZ9CNM23RMw8wGEfPeP5fE6cBUb0pQHQdsm4mAphj8JcO9eqNtCCWGHSHby53o9cuDGel0ZZRckMKt7PYhAlVuM1E3g3pAtdsvUESKb3UALKpCboPancq8PJzNIe1F2g4Te51KnZCt3FLYF9gwPs8HrKcDw5I32ArKT0OkSAyy7nFj2NtG8ipEIvrkO46tEqqWW1HLolKs8XquxePWvOFG8At6G
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	<p>qBXJGedKSnfLwJQUxSstJhm803kj3CmD zte6rEMKIFTlm5DWeT49K3pnTTQNx9LZ z0TQA7HZyznBSw3CmPcTUoQP4L3neruB pRgsymBRw6GzBwC3xk0QZjtBysPi63Tn PDU6wRropNTQ19y2eDTbdEa9cBBYPUUA 00aMvJrgGkaIONj3PD7LXC711VYj9ju8 b3fQBHyK0QhRee3f4S8rveOqp5FXwW5p qa9FmkYj4HytFeROQ9vJ3OuUk0QHa0HH UvxIYdgn2wfipN364Vf73tUZ9CNM23RM w8wGEfPeP5fE6cBUb0pQHQdsm4mAphj8 JcO9eqNtCCWGHSHby53o9cuDGel0ZZRC kMKt7PYhAlVuM1E3g3pAtdsvUESKb3UA LKpCboPancq8PJzNielF2g4Te51KnZCt 3FLYF9gwPs8HrKcDw5I32ArKT0OkSAyy 7nFj2NtG8ipEivrko46tEqqWW1HLolKs 8XquxePWvOFG8At6GqBXJGedKSnfLwJQ UxSstJhm803kj3CmDzte6rEMKIFTlm5D WeT49K3pnTTQNx9LZz0TQA7HZyznBSw3 CmPcTUoQP4L3neruBpRgsymBRw6GzBwC 3xk0QZjtBysPi63TnPDU6wRropNTQ19y 2eDTbdEa9cBBYPUUA00aMvJrgGka7LXC 711VYj9ju8b3fQBHyK0QhRee3f4S8rve Oqp5FXwW5pqa9FmkYj4HytFeROQ9vJ3O uUk0QHa0HHUvxIYdgn2wfipN364Vf73t UZ9CNM23RMw8wGEfPeP5fE6cBUb0pQHQ dsm4mAphj8JcO9eqNtCCWGHSHby53o9c uDGel0ZZRCkMKt7PYhAlVuM1E3g3pAtd svUESKb3UALKpCboPancq8PJzNielF2g 4Te51KnZCt3FLYF9gwPs8HrKcDw5I32A rKT0OkSAyy7nFj2NtG8ipEivrko46tEq qWW1HLolKs8XquxePWvOFG8At6GqBXJG edKSnfLwJQUxSstJhm803kj3CmDzte6r EMKIFTlm5DWeT49K3pnTTQNx9LZz0TQA 7HZyznBSw3CmPcTUoQP4L3neruBpRgsy mBRw6GzBwC3xk0QZjtBysPi63TnPDU6w RropNTQ19y2eDTbdEa9cBBYPUUA00aMv JrgGkaIONj3PD8mN7LXC711VYj9ju8b3 fQBHyK0QhRee3f4S8rveOqp5FXwW5pqa 9FmkYj4HytFeROQ9vJ3OuUk0QHa0HHUv xIYdgn2wfipN364Vf73tUZ9CNM23RMw8 wGEfPeP5fE6cBUb0pQHQdsm4mAphj8Jc O9eqNtCCWGHSHby53o9cuDGel0ZZRCkM Kt7PYhAlVuM1E3g3pAtdsvUESKb3UALK pCboPancq8PJzNielF2g4Te51KnZCt3F LYF9gwPs8HrKcDw5I32ArKT0OkSAyy7n Fj2NtG8ipEivrko46tEqqWW1HLolKs8X quxePWvOFG8At6GqBXJGedKSnfLwJQUx SstJhm803kj3CmDzte6rEMKIFTlm5DWe</p>
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	T49K3pnTTQNx9LZz0TQA7HZyznBSw3Cm PcTUoQP4L3neruBpRgsymBRw6GzBwC3x k0QZjtBysPi63TnPDU6wRropNTQ19y2e DTbdEa9cBBYPUUA00aMvJrgGkaIONj3P D8mNIONj3PD8mN8mN"
Output	VC Signed data has been written to /home/ch/.taibom/test@tester.com - identity.json/home/ch/.taibom/te st@tester.com-identity.json VC Signed data has been written to /media/ch/4662ebec-a384-457c- b4cb-1e7419677d2f/TAIBOM- identity-0aeafcec-b3fc-4349- 8782-dab2bb8142be.json
Test runs correctly but should include an upper character limit	

24. Generate identity with reserved domains (.invalid)

Test Executed	taibom generate-identity "Test Name" "T@r.invalid" "Developer"
Output	VC Signed data has been written to /home/ch/.taibom/T@r.invalid- identity.json VC Signed data has been written to /home/ch/nqminds-taibom-sdk- 0.0.1/package/TAIBOM-identity- 3f54f8f1-44d5-42a2-8e4d- edf5503ba48e.json
Test passes but should be invalid https://en.wikipedia.org/wiki/.invalid	

25. Generate identity with reserved domains (.localhost)

Test Executed	taibom generate-identity "Test Name" "T@r.localhost" "Developer"
Output	Invalid email format.
Test fails as expected https://en.wikipedia.org/wiki/.localhost	



26. Generate identity with invalid email

Test Executed	<code>taibom generate-identity "Test Name" "invalid-email" "Developer"</code>
Output	<code>"Invalid email format"</code>

Test fails as expected

27. Generate identity special characters in name

Test Executed	<code>taibom generate-identity " !@#\$%^&*() " "Test@tester.com" "Developer"</code>
Output	<code>bash: !@#: event not found</code>

Test fails as expected

28. Generate identity special characters in email

Test Executed	<code>taibom generate-identity "Test Name" "test@ex!ample.com" "Developer"</code>
Output	<code>bash: !ample.com: event not found</code>

Test fails as expected

29. Generate identity empty role

Test Executed	<code>taibom generate-identity "Test Name" "Test@tester.com" ""</code>
Output	<code>VC Signed data has been written to /home/ch/.taibom/Test@tester.com-identity.json VC Signed data has been written to /home/ch/nqminds-taibom-sdk-0.0.1/package/TAIBOM-identity-fc729cdb-7197-4345-bfb4-ba37ae238e5e.json</code>

Test passes but should fail as role is a required field



30. Generate identity with special characters

Test Executed	<code>taibom generate-identity "Test Name" "Test@tester.com" "@#\$%^&*()"</code>
Output	<code>VC Signed data has been written to /home/ch/.taibom/Test@tester.com-identity.json VC Signed data has been written to /home/ch/nqminds-taibom-sdk-0.0.1/package/TAIBOM-identity-5ca2a9b2-8a4e-4a9c-b6e9-4f0e1a517fb0.json</code>

Passes but should fail as the test is using reserved characters

31. Generate identity SQL injection

Test Executed	<code>taibom generate-identity "Test Name" "Test@tester.com" "'"; DROP TABLE users; --"</code>
Output	<code>VC Signed data has been written to /home/ch/.taibom/Test@tester.com-identity.json VC Signed data has been written to /home/ch/nqminds-taibom-sdk-0.0.1/package/TAIBOM-identity-25862e55-890c-405e-bf36-3ecc2b2aae7c.json</code>

SQL injection attempt should be detected
Passes but should fail

32. Generate identity script injection

Test Executed	<code>taibom generate-identity "Test Name" "Test@tester.com" "<script>alert('hacked');</script>"</code>
Output	<code>VC Signed data has been written to /home/ch/.taibom/Test@tester.com-identity.json</code>



	VC Signed data has been written to /home/ch/nqminds-taibom-sdk-0.0.1/package/TAIBOM-identity-6a78f972-6675-4ab6-beda-eb2ebd218863.json
Malicious Role is stored in the .json as role": "<script>alert('hacked');</script>" Passes but should fail	

33. Generate identity excessive whitespace

Test Executed	taibom generate-identity " Test Name " " whitespace@tester.com " " Developer "
Output	Invalid email format.
Fails as expected	

34. Generate identity duplicate email

Test Executed	taibom generate-identity "Test Name" "mark@tester.com" "Developer" then taibom generate-identity "Test Name" "mark@tester.com" "Developer"
Output	VC Signed data has been written to /home/ch/.taibom/mark@tester.com- identity.json VC Signed data has been written to /home/ch/nqminds-taibom-sdk- 0.0.1/package/TAIBOM-identity-50f87bd8- f4d1-4de2-931e-a9357338f475.json Then VC Signed data has been written to /home/ch/.taibom/mark@tester.com- identity.json VC Signed data has been written to /home/ch/nqminds-taibom-sdk- 0.0.1/package/TAIBOM-identity-0f0c0ef4-f10d- 4597-990c-6576f39c259e.json
No validation on user creation, this command should fail as it overwrites the existing identity including public and private keys	



35. Generate identity extra arguments

Test Executed

```
taibom generate-identity "Test  
Name" "Test@tester.com"  
"Developer" "ExtraArg"
```

Output

```
VC Signed data has been written  
to  
/home/ch/.taibom/Test@tester.com  
-identity.json  
VC Signed data has been written  
to /home/ch/nqminds-taibom-sdk-  
0.0.1/package/TAIBOM-identity-  
31762c95-5399-40c0-b565-  
ee202f03e4b5.json
```

Should reject superfluous argument