



**P P SAVANI UNIVERSITY
ACADEMIC YEAR-2025-26**

**Assignment No. - 4
ON
BLOCKCHAIN TECHNOLOGY(SSCS3021)**

TITLE: Use an online service to generate hashes for content

BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY (BSC-IT)

SUBMITTED TO:

**Name: KAUSHAL SINGH(KSV)
Designation: ASSISTANT PROFESSOR
P P Savani University**

**Max. Marks: 50
Marks Obtained:**

Faculty Signature: _____

SUBMITTED BY:

**Name: RAJ MO FAHIM ZAKIR
Enrollment: 23SS02IT161
BSCIT5B-Batch 2023-26**

**INSTITUTE OF COMPUTER SCIENCE AND APPLICATIONS
P P SAVANI UNIVERSITY
MANGROL, SURAT- 394125 (GUJARAT)**



Student Name: RAJ MO FAHIM ZAKIR
Enrolment Number: 23SS02IT161
Subject Name: BLOCKCHAIN TECHNOLOGY
Subject Code: SSCS3021

Practical-4

Date:16/07/2025

Aim: Use an online service to generate hashes for content.

Part A: Hashing Text Content

Input Text: Blockchain is revolutionizing technology.

Generated Hashes:

Algorithm	Hash Output
MD5	0a07a65ab4d1c3f7d8d2b9f58794429a
SHA-1	20d71cc80065ca94cddc8eadee58b02dc4b9cb8d
SHA-256	315b3a734dcec553bbfcff6d45312e92e388e57c68af4538523ecae62f748784
SHA-512	387a98abecd914ba694e79f7bde876c7252bd94d172084e2ee0fae396b7008e54d43efe481a7c66300f855f99107fa572be8308ce62f51b153b2a74cb76e5010

Part B: Demonstrate Avalanche Effect

Modified Text:

Blockchain is revolutionising technology.

New Hashes:

Algorithm	Hash Output
MD5	a725d3854125abe2dd4fa98f30f86ed3
SHA-1	7b115d143833008c946ed2e135b6516d68cebc81
SHA-256	a32790f7b5fad68afea3a7c4529c3b3aa12fc169e220eb4953bb45b3afea27c
SHA-512	6f6b32b5edc09449a82710c69578fd989d5cac1aa992152445e2914ac10261fa2a087160af4249acf7422c6c691e93e7d361d4222b719d5b25344a9096a01f08

Hash Output Comparisons

Algorithm	Part A Hash	Part B Hash	Match?	% Similarity
MD5	0a07a65ab4d1c3f7d8d2b9f58794429a	a725d3854125abe2dd4fa98f30f86ed3	✗	Very low
SHA-1	20d71cc80065ca94cddc8eadee58b02dc4b9cb8d	7b115d143833008c946ed2e135b6516d68cebc81	✗	Very low

Algorithm	Part A Hash	Part B Hash	Match?	% Similarity
SHA-256	315b3a734dcec 553bbfcff6d453 12e92e388e57c 68af4538523ec ae62f748784	a32790f7b5fad6 8afea3a7c4529c 3b3aaaf12fc169e2 20eb4953bb45b 3afea27c	X	Extremely different
SHA-512	387a98abecd91 4ba694e79f7bd e876c7252bd9 4d172084e2ee 0fae396b7008e 54d43efe481a7 c66300f855f99 107fa572be830 8ce62f51b153b 2a74cb76e501 0	6f6b32b5edc094 49a82710c6957 8fd989d5cac1aa 992152445e291 4ac10261fa2a08 7160af4249acf7 422c6c691e93e7 d361d4222b719 d5b25344a9096 a01f08	X	Nearly no matching pattern

Part C: Hashing File Content (Optional if service supports file hashing)

Original File Content: Blockchain ensures secure and transparent transactions.

Modified File Content (added a space): Blockchain ensures secure and transparent transactions.

Algorithm	Original Hash	Modified Hash	Changed?	% Similarity (approx)
MD5	23a355d436f0a9 bd676842da01f9 5190	5f0d6347028c1b7 c7d6e84b86b8d8 683	<input checked="" type="checkbox"/>	~6%
SHA-1	caf3b7602ca2eef 1e9e81c1e6c459 ae06f0a52df	f8541937d111743 b9df9b5bcdf7d54 ded226fe04	<input checked="" type="checkbox"/>	~3-5%
SHA-256	d4f79781958bfe 57133f4197f149 cad201cf355857 b1c676aa2678f1 986d9456	83af3caa73709a2 34c80b8e1ec0040 845b2bdb366532 56157c08cb2e3e7 a6f0c	<input checked="" type="checkbox"/>	~2-4%



Algorithm	Original Hash	Modified Hash	Changed?	% Similarity (approx)
SHA-512	9ed61a4def86d7 1a217e4b7a64b 0422772061730 e3077d56b665c 382117d6f9485 6f75265e0b20c8 4fa03e085fb83c 7185566203dbc 0cccd051cc98ea8 ac62845	443b26b1e4a5d2 759a4c45536292 d98bbc888ef16c2 901258ac5e84572 f04054a80248dbd 06b11b2c856bffb d6ef18a322158e1 fa2c9f7517021a5c 201c3fd8d	<input checked="" type="checkbox"/>	<2%

Step 3 – Analysis and Observation

1. Hash Comparison: Original vs Modified Data:

On average, over 90% of the characters differ in each algorithm's hash, proving the Avalanche Effect.

2. Why Does a Single Character Change Produce Completely Different Hashes?

Hash functions are highly sensitive to input. Even a tiny change (like altering one letter, word, or punctuation) completely reshuffles the output. This happens because:

- Hashing algorithms use complex bitwise operations and permutations.
- Even a 1-bit change in input propagates across all bits in the hash.
- This design ensures unpredictability and uniqueness.

This behavior is intentional and necessary in cryptographic systems.

3. Importance of Avalanche Effect in Blockchain

a. Data Immutability

- Once a block is added, any change in its data alters its hash.
- This makes it easy to detect tampering.
- Ensures that data stored on the blockchain is permanent and trustworthy.

b. Block Linking

- Every block stores the hash of the previous block.



Student Name: RAJ MO FAHIM ZAKIR

Enrolment Number: 23SS02IT161

Subject Name: BLOCKCHAIN TECHNOLOGY

Subject Code: SSCS3021

- If even a tiny change occurs in one block, the hash changes, and the link to the next block breaks.
- This invalidates the entire chain, protecting the blockchain structure.

c. Security Against Tampering

- Attackers can't modify data undetected, as any change triggers a hash mismatch.
- To successfully alter one block, an attacker would have to recalculate hashes for all subsequent blocks, which is computationally infeasible in decentralized systems.

Conclusion

The Avalanche Effect shown in your original and modified hashes:

- Confirms the integrity of cryptographic hash functions.
- Demonstrates how blockchain maintains data integrity, immutability, and resistance to tampering.
- Is a core principle in securing distributed ledger technologies like Bitcoin and Ethereum.