Information Technology University

Department of Computer Science

http://www.itu.edu.pk

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Blockchain

Assignment # 01

100 Marks

Q1: Implement a Merkel tree using a large text file having size of 1 gigabyte and provide a working code for checking whether:

a) The data block is a part of Merkle tree (Proof of membership)

b) The data is not part of Merkle tree (Proof of non-membership)

Note: This assignment should be done in Python and only students without any experience with Python should choose another language.

Instruction for text file generation:

Step 1: Copy and paste the **generate_random_text_file** function into your Python script. Ensure that this function is included in your code.

Step 2: To generate a text file with a specific size, call the **generate_random_text_file** function in your script and provide two arguments:

- **file_path**: A string specifying the file name and path where you want to save the generated text file.
- **file_size**: An integer representing the desired file size in gigabyte (GB).

Step 3: Run your Python script containing the function call.

Step 4: Check the directory where your Python script is located, and you will find the generated text file with the name and path you provided in **file_path**.

Example 1: Generating a 10MB File:

generate_random_text_file('sample_10mb.txt', 10*1024) # This creates a 10 MB file named 'sample_10mb.txt'.

Q2: Explain the difference between verkle tree and merkle tree. (20)

Submission Details:

- Submit your code and pdf report containing solution of above two questions in a single zip file with the name FirstName_RollNumber_01.zip
- Your report must contain output of your merkle tree proofs and explanation of your results.
- Submit a single zip file containing
  (a) Code file (b) Pdf Report
- Follow the naming convention.
- For each convention, there is a 3% penalty if you don't follow it.
- Email instructor or TA if there are any questions.
- Plagiarism will lead to a straight zero with additional consequences as well.
- 10% (of obtained marks) deduction per day for a late submission.