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Assignment 1:

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Problem Statement:

Amidst the backdrop of a nation locked in a battle for its very ideals and survival, you find yourself thrust into the heart of the conflict. Though compelled to serve in the army by duty, it is your exceptional problem-solving abilities, keen intelligence, and meticulous attention to detail that have garnered you a unique position within the Central Intelligence Team.

However, fate takes a grim turn as our camp falls victim to enemy infiltration. In a devastating blow, the entire Cypher team is compromised and mercilessly eliminated, leaving you as the sole survivor of your division. Now, the weight of the nation's future rests solely on your shoulders.

In a desperate bid to salvage the outcome of the war, your division leader reaches out to you with a message:

"Dear Esteemed Cadet,

In the crucible of World War 3, our nation stands at the brink of history, facing a formidable adversary with unparalleled resolve. Despite our numerical disadvantage, our spirit remains unbroken, fueled by the virtues of courage, unwavering commitment, and boundless innovation.

In a bold and audacious move, our intelligence network has infiltrated the enemy's inner sanctum, embedding spies within their military hierarchy. Through their valiant efforts, we have obtained crucial intelligence regarding the enemy's encryption and decryption protocols, as well as their intricate methods of message transmission.

Our adversaries employ a sophisticated three-tiered encryption process, whereby the original message undergoes successive layers of encryption as it traverses through the ranks. Team Alpha, the first line of defense, encrypts the message using Algorithm 1 before passing it to Team Beta. Team Beta then adds its encryption layer, utilizing Algorithm 2, before forwarding the message to Team Gamma. Finally, Team Gamma applies the third encryption algorithm, Algorithm 3, before transmitting the message to the battlefield.

But the enemy's cunning doesn't end there. To further fortify their communications, they employ a strategic maneuver during message transmission. Utilizing four distinct channels, they fragment the message, distributing parts of it across each channel. This ingenious tactic ensures that even if one channel is compromised, only a fraction of the message is exposed, safeguarding the integrity of their communication network.

Through the courageous actions of our spies and the daring incursions of our soldiers, we have obtained invaluable intelligence. We now possess partial encrypted message fragments exchanged between teams, as well as the final encrypted message intercepted from Team Gamma.

As members of the Central Intelligence Team, you are tasked with a mission of paramount importance – to decipher the encrypted message and unveil its hidden meaning. Armed with knowledge of the enemy's encryption algorithms and access to their Python code implementations, you must develop an algorithm capable of unraveling the intricate layers of encryption.

Remember, while our adversaries may possess numerical superiority, they cannot match the indomitable spirit and resilience of our forces. With determination as our weapon and innovation as our shield, victory is within our grasp.

Your success in this mission is vital to the security and prosperity of our nation. Prepare a comprehensive document detailing your algorithmic approach and provide the Python code for review by our Intelligence Officer before dissemination to the General.

Our Intelligence Officer will share the algorithms and messages via a secured channel. Please chime in to the relevant frequency.

You will have:

- 1. Algorithm 1, Algorithm 2 & Algorithm 3*
- 2. Partial Encryption 1, Partial Encryption 2 , Full Final Encryption*
- 3. Python codes for all the algorithms*

Final note to remember: *We secretly know that keywords used in the cyphers are extracted from the original message itself.*

The fate of our nation rests in your hands, brave cadets. May your resolve be unwavering, and may the light of victory shine upon us.

*With utmost confidence and solidarity,
Tiger Pathan
Central Intelligence Team Leader"*

Example Scenario:

Original Message: "This is just an example to explain the problem"

Algorithm 1: Vigenere Cipher

Key for Algorithm 1: This

Input Message: This is just an example to explain the problem

Encrypted Message 1: Moqk bz rmla if xeieism lh lfhehqf mom hkvjdxt

Algorithm 2: Keyword Cipher

Key for Algorithm 2: to

Input Message: Moqk bz rmla if xeieism lh lfhehqf mom hkvjdxt

Encrypted Message 2: KMPI OZ QKJT GD XCGCGRK JF JDFCFPD KMK FIVHBXS

Algorithm 3: Atbash Cipher

Key for Algorithm 3: example

Input Message: KMPI OZ QKJT GD XCGCGRK JF JDFCFPD KMK FIVHBXS

Encrypted Message 3: PNKR LA JPQG TW CXTXTIP QU QWUXUKW PNP URESYCH

Deciphering (In reverse order of Encryption):

Algorithm 3: Atbash Cipher

Key for Algorithm 3: example

Input Message: PNKR LA JPQG TW CXTXTIP QU QWUXUKW PNP URESYCH

Decrypted Message 3: KMPI OZ QKJT GD XCGCGRK JF JDFCFPD KMK FIVHBXS

Algorithm 2: Keyword Cipher

Key for Algorithm 2: to

Input Message: KMPI OZ QKJT GD XCGCGRK JF JDFCFPD KMK FIVHBXS

Decrypted Message 2: MOQK BZ RMLA IF XEIEISM LH LFHEHQF MOM HKVJDXT

Algorithm 1: Vigenere Cipher

Key for Algorithm 1: This

Input Message: MOQK BZ RMLA IF XEIEISM LH LFHEHQF MOM HKVJDXT

Decrypted Message 1: THIS IS JUST AN EXAMPLE TO EXPLAIN THE PROBLEM

Considering this example, you would just receive the following details from our Intelligence Officer.

Algorithm 1: Vigenere Cipher

Encrypted Message 1: M* *z r*/i* j* x**i*sm lh l*he*q* m*m hk***xt**

Algorithm 2: Keyword Cipher

Encrypted Message 2: KI O* Q*** G* X**C*R* JF J***F*D K** F*****S**

Algorithm 3: Atbash Cipher

Encrypted Message 3: PNKR LA JPQG TW CXTXTIP QU QWUXUKW PNP URESYCH

Our hopes are on you to come up with the retrieved information:

THIS IS JUST AN EXAMPLE TO EXPLAIN THE PROBLEM