

Cry – Project 1 (Project Plan): Presentation

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Section 1

Motivation

- Problem: An end-user wants to send and receive secure messages with other end-users.
- Solution: Cry lets end-users establish secure communication via built-in cryptosystems.

- Problem: As new technologies emerge, and as technology improves, new cryptosystems need to be developed.
- Solution: Cry allows cryptographers to easily prototype and benchmark their new cryptosystems.

Section 2

Overview

Subsection 1

Example Use Case

Situation

- *Alice* (sender) wants to confidentially send a message to *Bob* (receiver).
- *Eve* (eavesdropper) wants to know that message.

Procedure

① Alice (sender)

```
$ cry encrypt --cryptosystem=rsa \  
> --public-key=825 --plaintext=4692301804  
The ciphertext is 1110003333 (took 1 second).
```

② Bob (receiver)

```
$ cry decrypt --cryptosystem=rsa \  
> --private-key=637 --ciphertext=1110003333  
The plaintext is 4692301804 (took 1 second).
```

③ Eve (eavesdropper)

```
$ cry eavesdrop --cryptosystem=rsa \  
> --public-key=825 --ciphertext=1110003333  
The plaintext is 4692301804 (took 1 century).
```

Subsection 2

Functionality

In the previous example:

- Cry is the cryptographic framework.
- RSA is a cryptosystem implemented in Cry.
- The key-generation, encryption, decryption, and eavesdropping algorithms are specific to RSA.

In general, with Cry:

- an end-user can use an implemented cryptosystem to confidentially send and receive messages with others.
- a cryptographer can:
 - prototype her own cryptosystems where the cryptographic algorithms are either newly defined or reused from different existing cryptosystems.
 - test her cryptosystems for security and performance.

Section 3

Expectation

- For end-users: Cry enables end-users to establish secure communication via simple command-line options.
- For cryptographers:
 - Being a modular object-oriented framework, Cry lets cryptographers easily define new cryptosystems.
 - Cry also reports the security measures of these cryptosystems.

in Comparison to an Existing Framework

- Charm is an existing cryptographic framework implemented in Python and C.
- Charm has advanced functionalities that we will be unable to provide in Cry due to time constraints.
- Cry will have a similar base for sandboxing and prototyping cryptosystems.

<https://github.com/vuphan314/cry>

To Cry, or not to Cry?

Will