

Cry – Project 2

(Software Requirements Specification): Report

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1 Introduction

Michael Degraw

1.1 Purpose

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1.2 Scope

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1.3 Definitions, acronyms, and abbreviations

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1.4 References

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1.5 Overview

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2 Overall description

Daniel Dunning

2.1 Product perspective

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2.2 Product functions

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2.3 User characteristics

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2.4 Constraints

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2.5 Assumptions and dependencies

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3 Specific requirements

Vu Phan

3.1 External interface requirements

```
$ cry generatekeys --cryptosystem=<cryptosystem>
```

The public & private keys are <public key> & <private key> (took <key-generation time>).

```
$ cry encrypt --cryptosystem=<cryptosystem>--plaintext=<plaintext>--publickey=<public key>
```

The ciphertext is (took).

3.1.1 User interfaces

3.1.2 Hardware interfaces

3.1.3 Software interfaces

3.1.4 Communications interfaces

3.2 Classes

3.2.1 cryptosystem/

cryptosystem.h

```
#ifndef CRYPTOSYSTEM_CRYPTOSYSTEM_H
#define CRYPTOSYSTEM_CRYPTOSYSTEM_H

////////////////////////////////////

enum EnumeratedCryptosystem {rsa}; // more to come

////////////////////////////////////

using IntPtr = mpz_t; // GNU Multiple Precision Integer Type
using Key = IntPtr;
using Text = IntPtr;

////////////////////////////////////

class Cryptosystem {
public:
    virtual void generateKeys(Key publicKey, Key privateKey); // set these

    virtual void encrypt(Text ciphertext, // set this
        const Text plaintext, const Key publicKey);

    virtual void decrypt(Text plaintext, // set this
        const Text ciphertext, const Key privateKey);

    virtual void cryptanalyze(Text plaintext, // set this
        const Text ciphertext, const Key publicKey);
};

////////////////////////////////////
```

```
#endif // CRYPTOSYSTEM_CRYPTOSYSTEM.H
```

rsa.h

```
#ifndef CRYPTOSYSTEM_RSA_H
#define CRYPTOSYSTEM_RSA_H

////////////////////////////////////

#include "cryptosystem.h"

////////////////////////////////////

class Rsa : public Cryptosystem {
public:
    void generateKeys(Key publicKey, Key privateKey); // set these

    void encrypt(Text ciphertext, // set this
        const Text plaintext, const Key publicKey);

    void decrypt(Text plaintext, // set this
        const Text ciphertext, const Key privateKey);

    void cryptanalyze(Text plaintext, // set this
        const Text ciphertext, const Key publicKey);
};

////////////////////////////////////

#endif // CRYPTOSYSTEM_RSA_H
```

3.2.2 party/

party.h

```
#ifndef PARTY_PARTY_H
#define PARTY_PARTY_H

////////////////////////////////////

#include "../cryptosystem/cryptosystem.h"

////////////////////////////////////

class Party {
public:
    Cryptosystem cryptosystem;
```

```

    Party(EnumeratedCryptosystem enumeratedCryptosystem);
};

////////////////////////////////////

#endif // PARTY_PARTY_H

```

sender.h

```

#ifndef PARTY_SENDER
#define PARTY_SENDER

////////////////////////////////////

#include "party.h"

////////////////////////////////////

class Sender : public Party {
public:
    Text ciphertext;

private:
    Text plaintext;

    void encrypt(const Key publicKey);
    // { cryptosystem.encrypt(ciphertext, plaintext, publicKey)}
};

////////////////////////////////////

#endif // PARTY_SENDER

```

receiver.h

```

#ifndef PARTY_RECEIVER
#define PARTY_RECEIVER

////////////////////////////////////

#include "party.h"

////////////////////////////////////

class Receiver : public Party {
public:
    Key publicKey;

```

```

private:
    Key privateKey;
    Text plaintext;

    void generateKeys();
        // { cryptosystem.generateKeys(publicKey, privateKey)}

    void decrypt(const Text ciphertext);
        // { cryptosystem.decrypt(plaintext, ciphertext, privateKey)}
};

////////////////////////////////////

#endif // PARTY_RECEIVER

```

eavesdropper.h

```

#ifndef PARTY_EAVESDROPPER
#define PARTY_EAVESDROPPER

////////////////////////////////////

#include "party.h"

////////////////////////////////////

class Eavesdropper : public Party {
private:
    Text plaintext;

    void cryptanalyze(const Text ciphertext, const Key publicKey);
        // { cryptosystem.cryptanalyze(plaintext, ciphertext, publicKey)}
};

////////////////////////////////////

#endif // PARTY_EAVESDROPPER

```

3.2.3 cryptoframework.h

```

#ifndef CRYPTOFRAMEWORK_H
#define CRYPTOFRAMEWORK_H

////////////////////////////////////

#include "party/sender.h"
#include "party/receiver.h"

```

```

#include "party/eavesdropper.h"

////////////////////////////////////

class Cryptoframework {
public:
    Sender sender;
    Receiver receiver;
    Eavesdropper eavesdropper;

    Cryptoframework(EnumeratedCryptosystem enumeratedCryptosystem);

    void testKeyGeneration();
        // { receiver.generateKeys() }

    void testEncryption();
        // { sender.encrypt(receiver.publicKey) }

    void testDecryption();
        // { receiver.decrypt(sender.ciphertext) }

    void testCryptanalysis();
        // { eavesdropper.cryptanalyze(sender.ciphertext, receiver.publicKey) }
};

////////////////////////////////////

#endif // CRYPTOFRAMEWORK.H

```

3.3 Performance requirements

3.4 Design constraints

3.5 Software system attributes

3.6 Other requirements