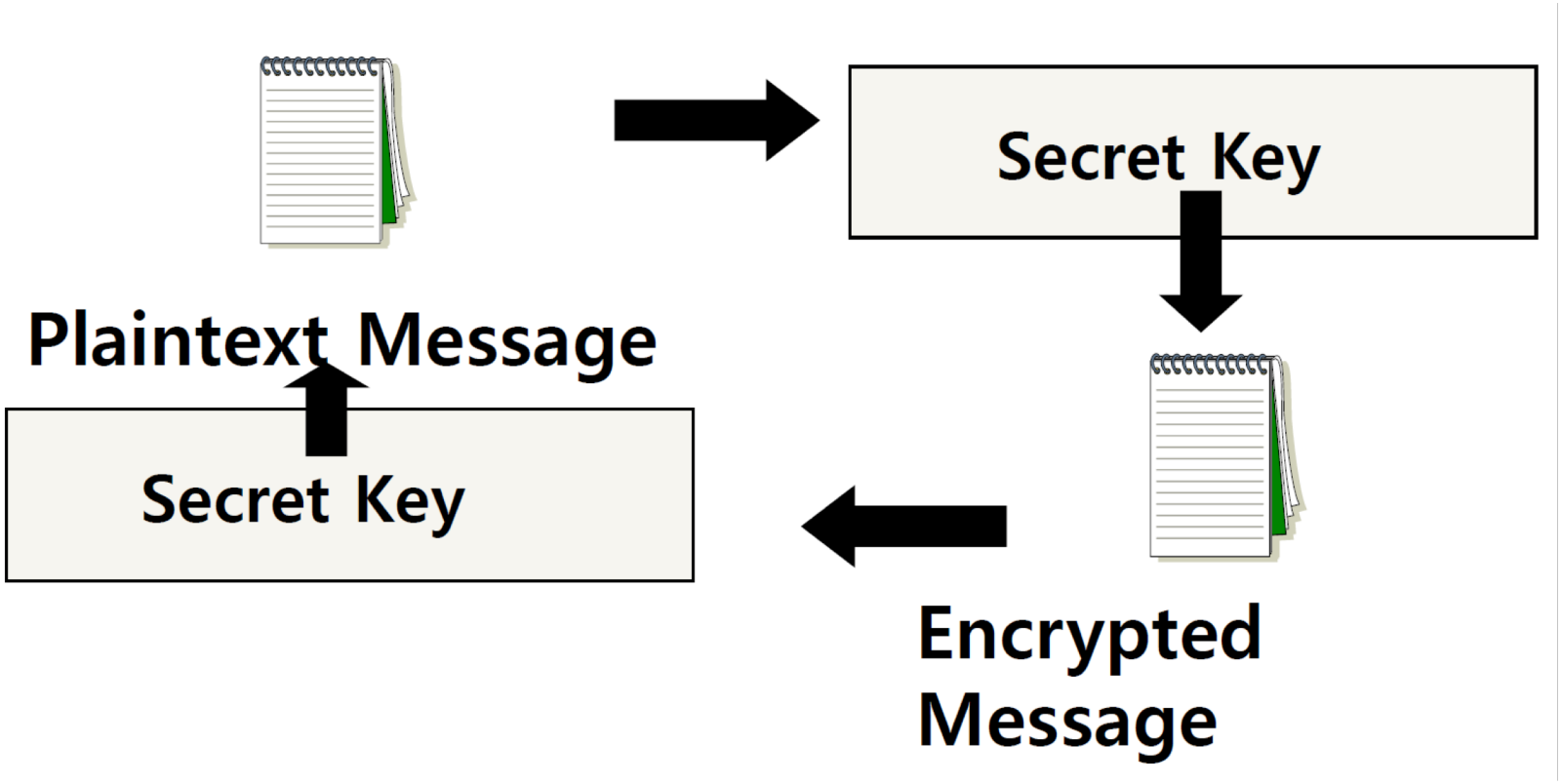
CS35L – Fall 2018

Slide set:	8.2
Slide topics:	Digital signatures
Assignment:	8

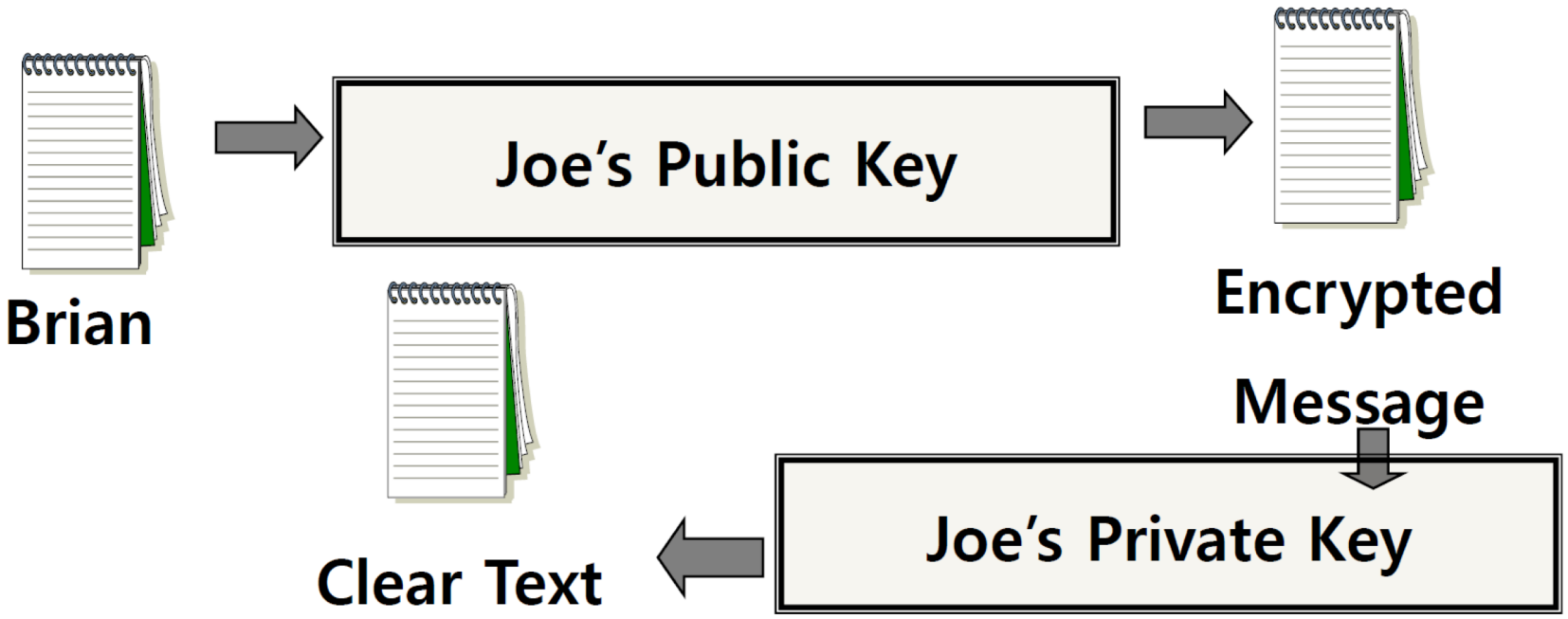
Secret Key (symmetric) Cryptography

- A single key is used to both encrypt and decrypt a message



Public Key (asymmetric) Cryptography

- Two keys are used: a public and a private key. If a message is encrypted with one key, it has to be decrypted with the other.



Digital Signature

- An electronic stamp or seal
  - almost exactly like a written signature, except more guarantees!
- Is appended to a document
  - Or sent separately (detached signature)
- Ensures data integrity
  - document was not changed during transmission

Steps for Generating a Digital Signature

SENDER:

1) Generate a *Message Digest*
   - The message digest is generated using a set of hashing algorithms
   - A message digest is a 'summary' of the message we are going to transmit
   - Even the slightest change in the message produces a different digest
2) Create a Digital Signature
   - The message digest is encrypted using the sender's *private* key. The resulting encrypted message digest is the *digital signature*
3) Attach digital signature to message and send to receiver

Steps for Generating a Digital Signature

RECEIVER:

1) Recover the *Message Digest*
   - Decrypt the digital signature using the sender's public key to obtain the message digest generated by the sender
2) Generate the Message Digest
   - Use the same message digest algorithm used by the sender to generate a message digest of the received message
3) Compare digests (the one sent by the sender as a digital signature, and the one generated by the receiver)
   - If they are not *exactly the same* => the message has been tampered with by a third party
   - We can be sure that the digital signature was sent by the sender (and not by a malicious user) because *only* the sender's public key can decrypt the digital signature and that public key is proven to be the sender's through the certificate.
   - If decrypting using the public key renders a faulty message digest, this means that either the message or the message digest are not exactly what the sender sent.

Digital Signature

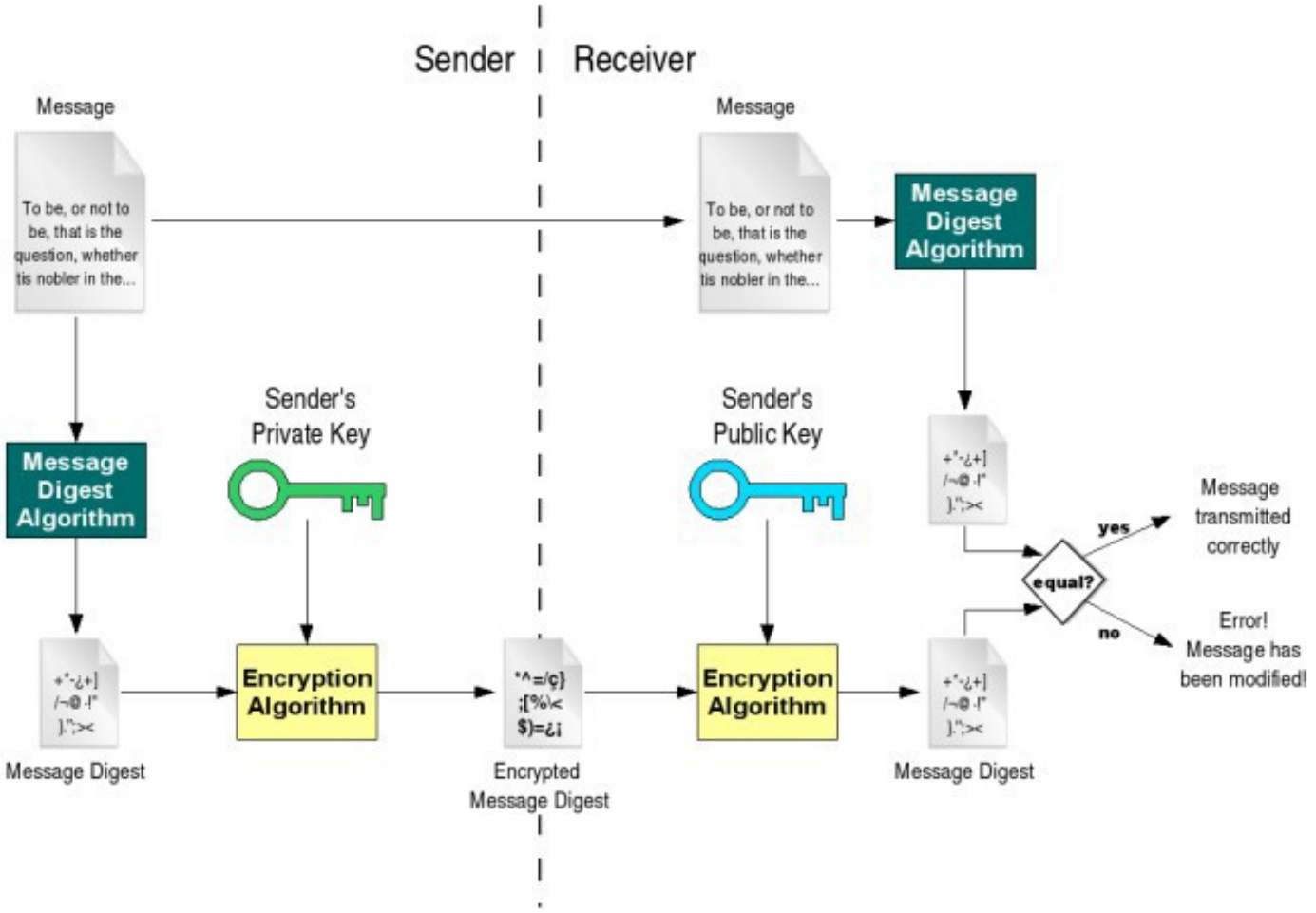


Image Source : gdp.globus.org

Detached Signature

- Digital signatures can either be *attached* to the message or *detached*
- A detached signature is stored and transmitted separately from the message it signs
- Commonly used to validate software distributed in compressed tar files
- You can't sign such a file internally without altering its contents, so the signature is created in a separate file

Homework 8

- Answer 2 questions in the file `hw.txt`
- A file `eeprom` that is a copy of the file `/sys/bus/i2c/devices/0-0050/eeprom` on your BeagleBone.
- https://www.gnupg.org/gph/en/manual.html
- Generate a key pair with the GNU Privacy Guard's commands (choose default options when prompted)
- Export public key, in ASCII format, into `hw-pubkey.asc`
- Use the private key you created to make a detached clear signature `eeprom.sig` for `eeprom`
- Use given commands to verify signature and file formatting
  - These can be found at the end of the assignment spec