



# C05 Hashing Applications

Uses of hashing  
Java hashCode()



# Uses of Hashing

- Hash table (implement a set or map)
- Checksums
  - Error detection and/or correction
- Compression
  - A hash is typically much more compact than the key
- Pruning a search
  - Looking for duplicates
- Cryptographic



# Practical Examples...



## Luhn Algorithm

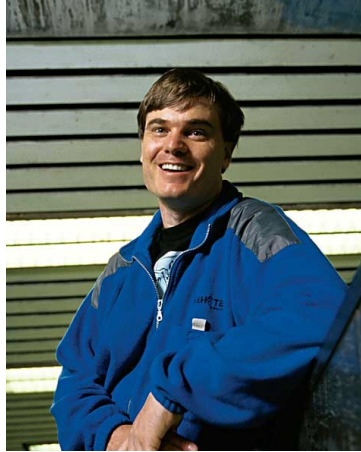
Used to check for transcription errors in credit cards (last digit checksum).



## Hamming Codes

Error correcting codes (as used in EEC memory).

# Practical Examples...



## **rsync (Tridgell)**

Synchronize files by (almost) only moving the parts that are different.



## **MD5 (Rivest)**

Previously used to encode passwords (but no longer).

# Java hashCode ( )

Java provides a hash code for every object.

- 32-bit signed integer
- Inherited from `Object`, but may be overwritten
- Objects for which `equals ( )` is `true` must also have the same `hashCode ( )`.
- The hash need not be perfect (i.e. two different objects may share the same hash).