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# Java Card Biometry API



Biometric Task Force  
Java Card Forum

# Java Card Forum (JCF)

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- ◆ Started by smart card manufacturers (Gemplus, Schlumberger, Oberthur, ...), now joined by
- ◆ major smart card issuers (Visa, Citibank, American Express, ...), and
- ◆ major smart card chip manufacturers (ST, Hitachi, NEC, ...), to

**promote open specifications for Java Card**

[www.javacardforum.org](http://www.javacardforum.org)



# Open APIs endorsed by JCF

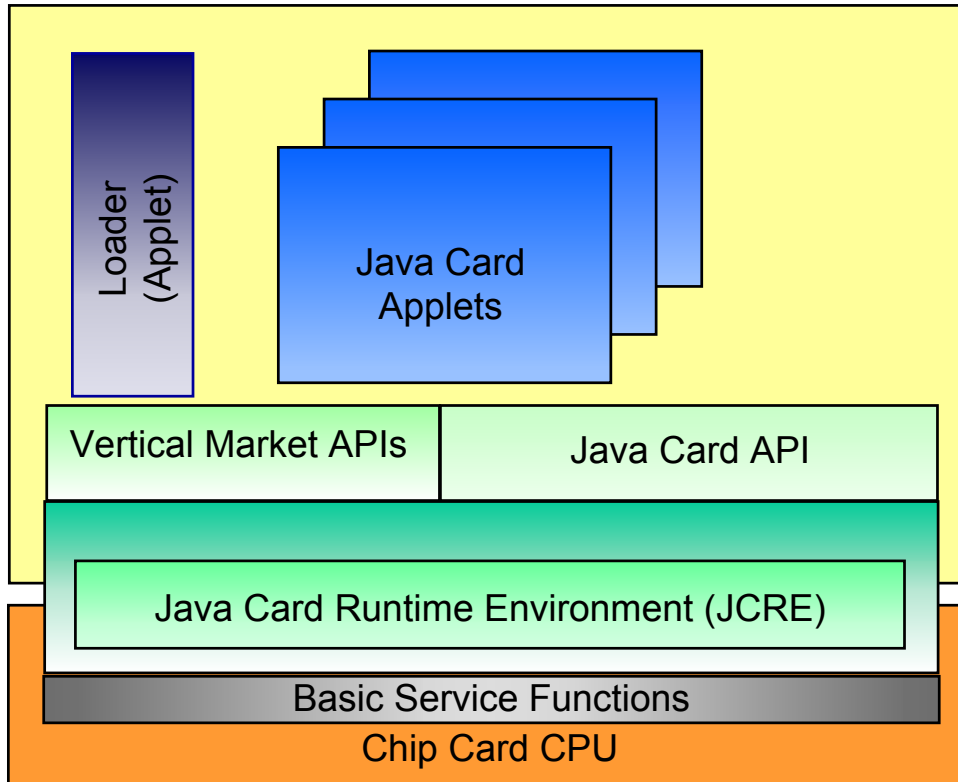
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- ◆ Java Card 2.1/2.2 API (Sun) - Foundation
- ◆ Global Platform 2.0.1/2.1 API - Financial
- ◆ European Telecommunications Standards Institute(ETSI) GSM 0319 API - Telecom



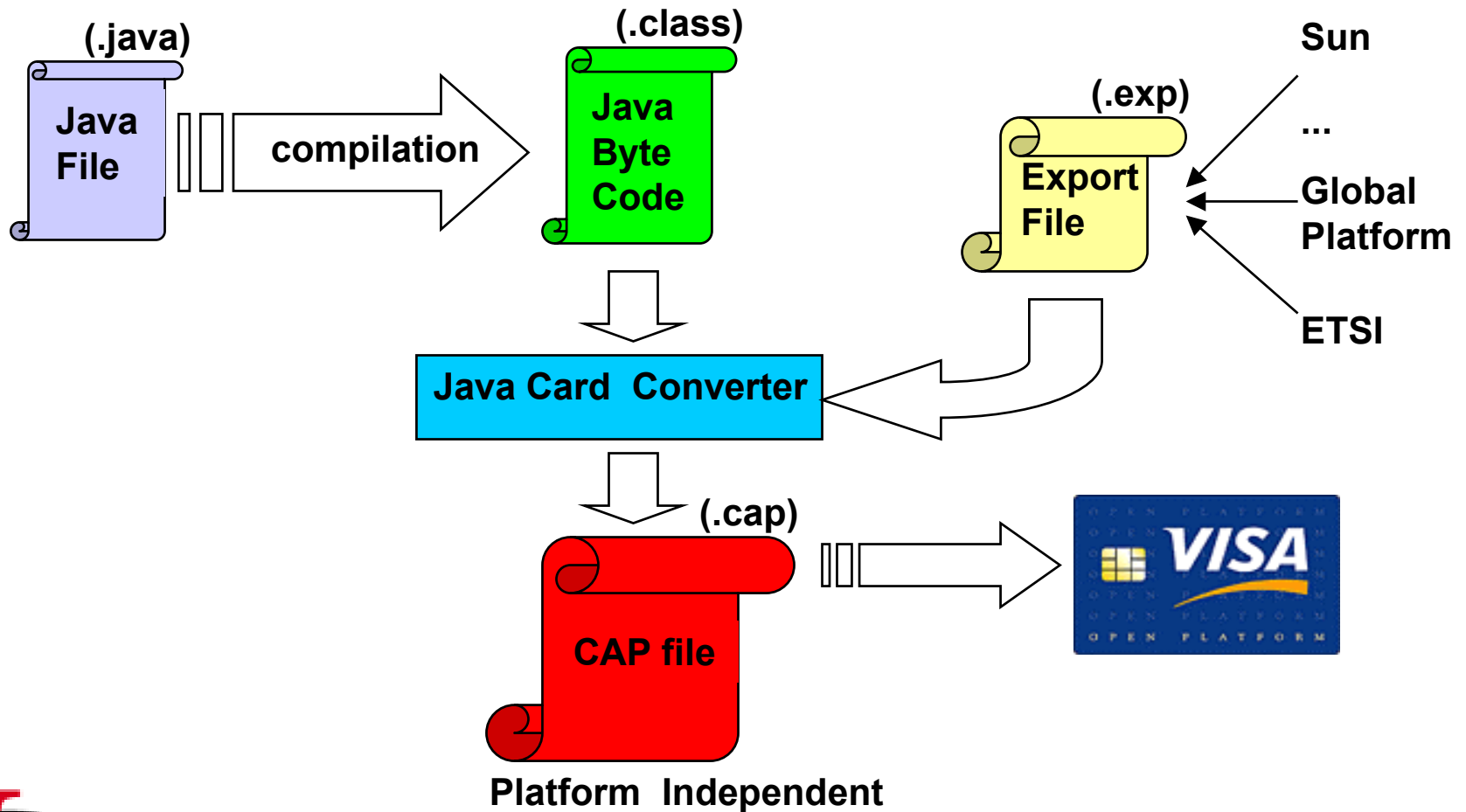
# Java Card : Java in a Smart Card

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- ◆ Subset of the Java programming language
- ◆ Adapt to the smart card memory model
- ◆ Radically simplified API's

# Java Card Development Process



# Biometry Task Force Members

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- ◆ Bart Bombay (Schlumberger)
- ◆ Christophe Musial (Oberthur)
- ◆ Ksheerabdhi Krishna (Schlumberger)
- ◆ Olivier Arous (Hitachi)
- ◆ Olivier Chamley (Oberthur)
- ◆ Patrick Van-Haver (Gemplus)

**NEW**

# Goal : Facilitate Match on Card

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## Use Java Card for

- ◆ Enrolling, Managing the Biometric data (templates) securely
  - ◆ Template stored only in the card, not on a server
- ◆ Making the comparison and granting rights
  - ◆ No sensitive information sent off card



# Java Card Biometry API Requirements

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- ◆ Enable efficient match on card
- ◆ Multiple templates, multiple biometrics
- ◆ Enable different applet implementations
  - ◆ Applet manages enrolling & matching
  - ◆ Server applet manages enrollment & matching Client applet requests matching services from Server applet
- ◆ Promote existing template formats - CBEFF
- ◆ Similar look & feel and security of Java Card API (PIN/OwnerPIN)
- ◆ Respect existing features of Global Platform (Shareable Global PIN/CVM)

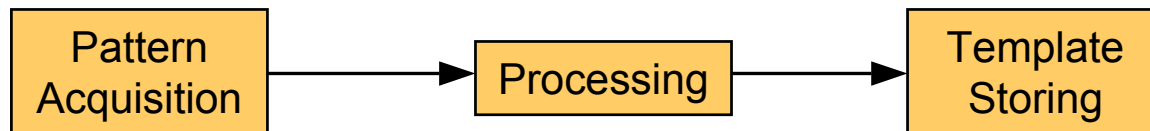


# Match On Card Architecture - I

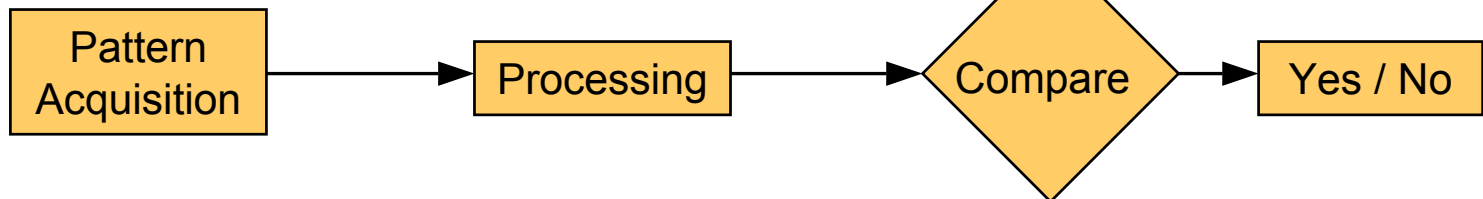
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## ◆ 2 Phases:

### ◆ Registration, Enrollment

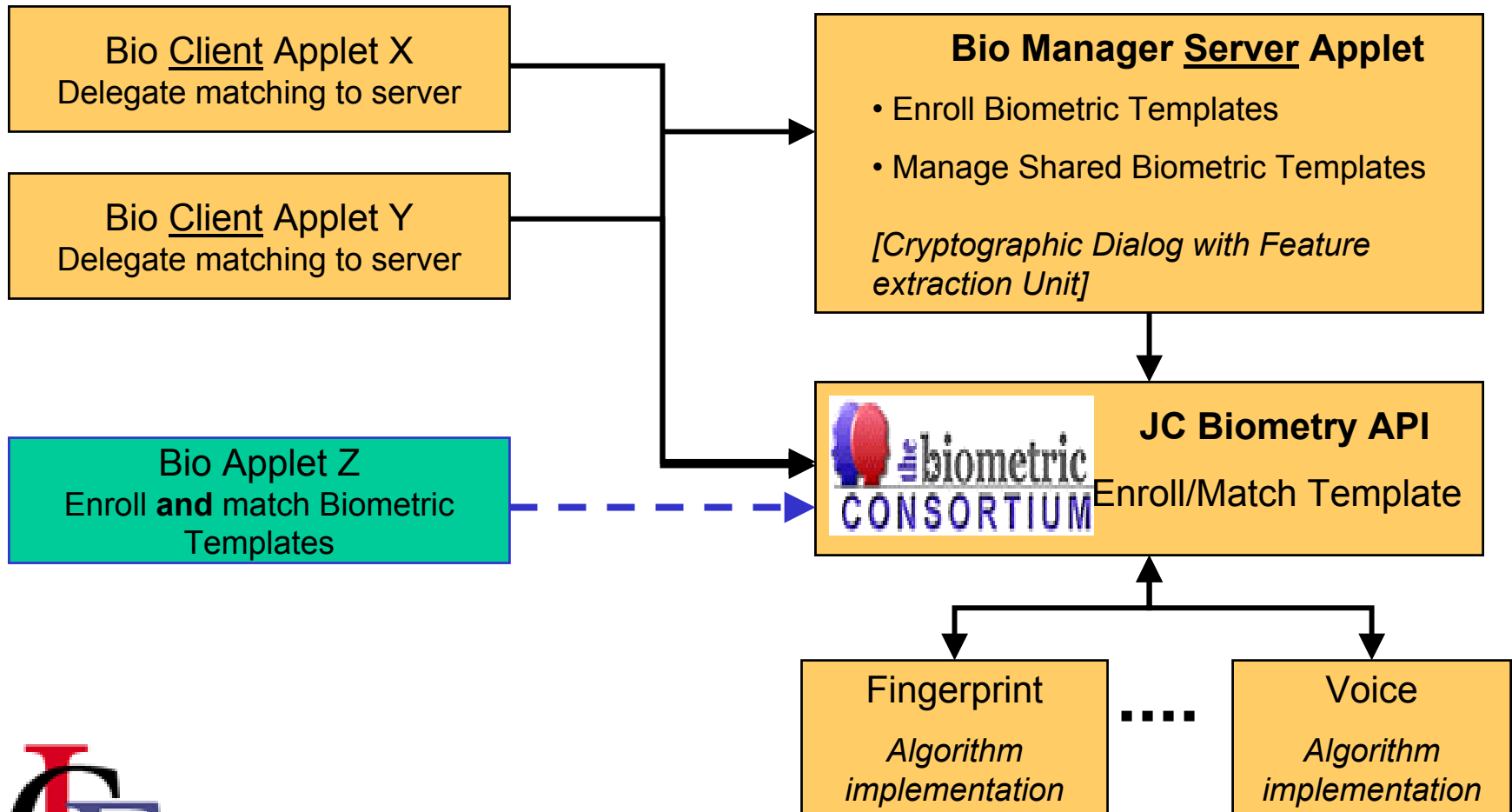


### ◆ Verification, Matching



# Match On Card architecture - II

- ◆ Enable different applet implementation styles



# What do we specify?

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- ◆ An on card API [Mandatory]
  - ◆ To enroll a template
  - ◆ To match a template
  - ◆ To manage counters
- ◆ A Biometry Manager Applet [Optional]
  - ◆ To manage multiple Templates/Biometrics
  - ◆ To share biometrics with the applets
  - ◆ To implement sensor specific features (e.g. cipher dialog, initialization...)
- ◆ Build on BC WG expertise



# JC Biometry API – Overview

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- ◆ On card API
  - ◆ A Template Factory : BioBuilder
  - ◆ Template Enroll & Match Interfaces : BioTemplate, OwnerBioTemplate, SharedBioTemplate
  - ◆ Exception : BioException
- ◆ Biometric manager applet - Defined Later
  - ◆ By the card issuer?
  - ◆ By Biometrics Consortium Working Group?
  - ◆ By Global Platform? (like the Card Manager)



# Factory - BioBuilder

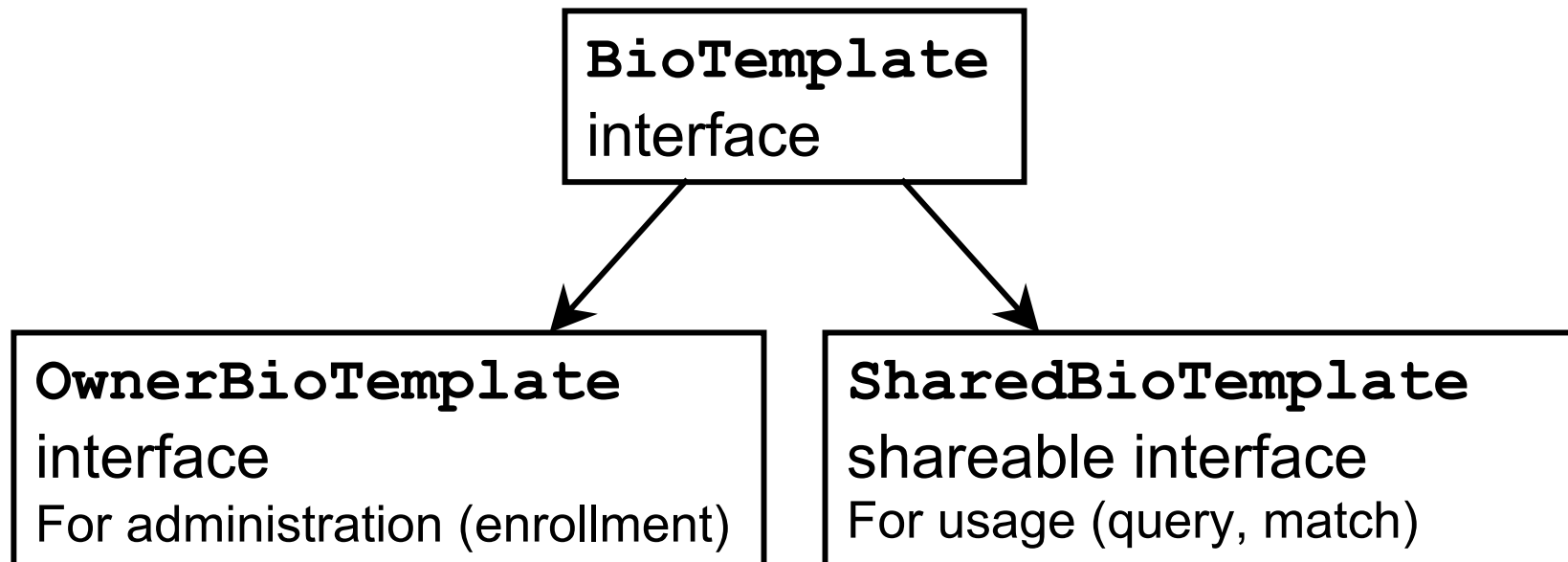
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- ◆ public class BioBuilder
  - ◆ static OwnerBioTemplate  
buildBioTemplate(byte bioType,  
byte bioSubType,  
byte tryLimit)
    - ◆ Allows different classes of objects(templates) to be returned if multiple biometrics supported
    - ◆ Limits overhead if biometry not supported
  - ◆ Biometric type constants (Voice, Iris, Fingerprint, etc.)



# Template Interface Overview

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- ◆ The BioTemplate interface for matching and querying
- ◆ The OwnerBioTemplate interface for enrollment
- ◆ The SharedBioTemplate interface provides a 'safe' window on the BioTemplate for client applets



# JCF & BC WG Collaboration [9/01]

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- ◆ JCF requests the BC WG to
  - ◆ provide input comments to the draft API
  - ◆ take ownership of / endorse API
- ◆ Tasks involved in API release
  - ◆ Assign Application Identifier(AID) for API
  - ◆ Publish API
  - ◆ Publish Export file
- ◆ JCF eager to help/contribute (web-site resources, expertise, liaison, etc. )



# JCF & BC WG Interactions

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## ◆ BC WG Questions to the JCF

❶ Should they endorse or contribute ?

⇒ Endorse, and contribute if they want

❷ What do we mean by JCF contributes ?

⇒ Web site resource, comments review, (no money)

❸ Talk about collaboration (press release) ?

⇒ Business committee

❹ Testing... What do we plan ?

⇒ Business committee

❺ Can they talk about API freely ?

⇒ Yes, it belongs to the community

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# JCF & BC WG Collaboration [2/02]

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- ◆ JCF requests the BC WG to
  - ◆ Provide input comments to the draft API
  - ◆ Host or link to the API specification
  - ◆ Publicize/Propagate/Endorse API
- ◆ JCF will administer tasks involved in API release
  - ◆ Assign Application Identifier(AID) for API
  - ◆ Publish API
  - ◆ Publish Export file



# Java Card Forum

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- ◆ Presentation & API available at  
[www.javacardforum.org/Documents/documents.html](http://www.javacardforum.org/Documents/documents.html)
- ◆ Next meeting in 04/02, Tokyo
- ◆ Questions from JCF :
  - ◆ Timeframe to expect from BC WG



# BC WG Timeline Proposal [2/02]

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- ◆ 2/28 : Collect inputs from BC WG and prepare diagram explaining interactions between CBEFF / Bio API / BSP / JC Biometry API / ...
  - ◆ Cathy Fulton, Uwe, Larry, Krishna
- ◆ 3/15 : Technical comments received
- ◆ 3/16 : Ballot issued to BC WG to decide how to move forward : endorsing(TBD) API
- ◆ 4/15 : Ballot due
- ◆ 4/22 : Close JC Biometry API 1.0 discussion



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# Java Card Biometry API

## Overview



# Factory - BioBuilder

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- ◆ public class BioBuilder
  - ◆ static OwnerBioTemplate  
buildBioTemplate(byte bioType,  
byte bioSubType,  
byte tryLimit)
    - ◆ Allows different classes of objects(templates) to be returned if multiple biometrics supported
    - ◆ Limits overhead if biometry not supported
  - ◆ Biometric type constants (Voice, Iris, Fingerprint, etc.)



# Biometric Type Constants

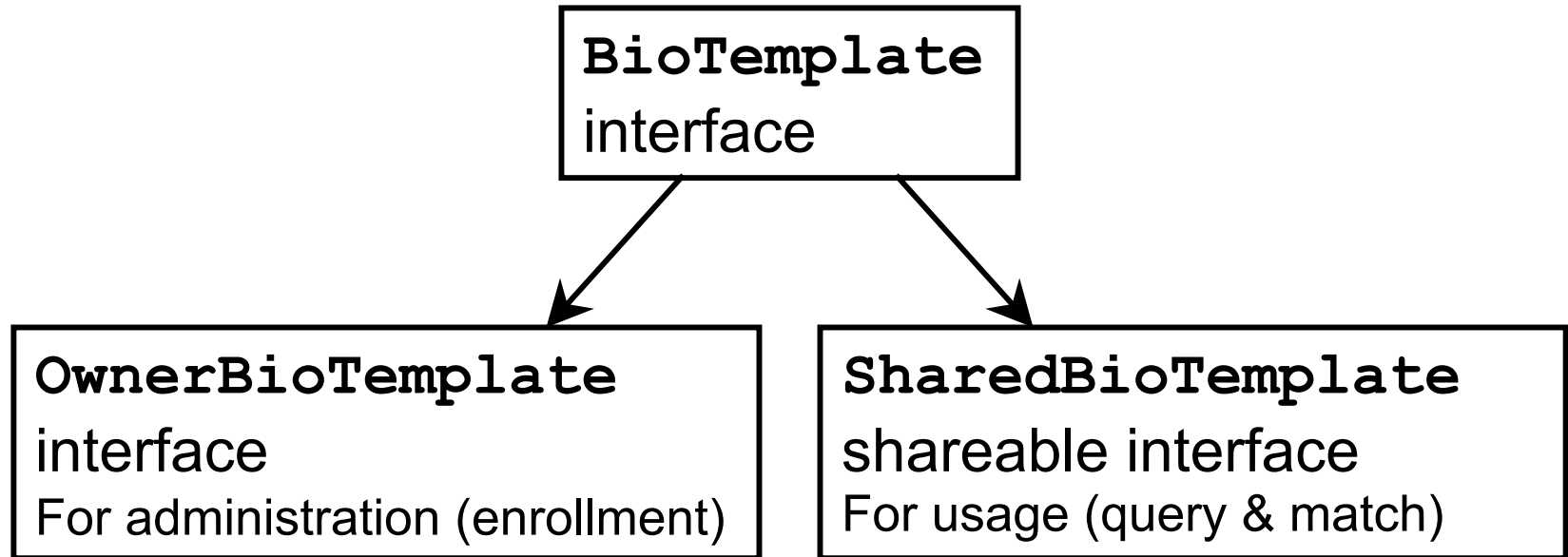
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- ◆ BODY\_ODOR
- ◆ DNA\_SCAN
- ◆ EAR\_GEOMETRY
- ◆ FACIAL\_FEATURE
- ◆ FINGERPRINT
- ◆ GAIT\_STYLE
- ◆ HAND\_GEOMETRY
- ◆ HAND\_PRINT
- ◆ IRIS\_SCAN
- ◆ KEYSTROKES
- ◆ LIP\_MOVEMENT
- ◆ PASSWORD
- ◆ RETINA\_SCAN
- ◆ SIGNATURE
- ◆ THERMAL\_FACE
- ◆ THERMAL\_HAND
- ◆ VEIN\_PATTERN
- ◆ VOICE\_PRINT



# Template Interfaces

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- ◆ The BioTemplate interface for matching and querying
- ◆ The OwnerBioTemplate interface for enrollment
- ◆ The SharedBioTemplate interface provides a 'safe' window on the BioTemplate for client applets

# BioTemplate Interface

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- ◆ public interface BioTemplate
- ◆ Contains querying and matching methods
- ◆ Factored into two subinterfaces to enable on-card server and client applet use



# BioTemplate Interface

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## ◆ Querying Methods

- ◆ byte getBioSubType()
- ◆ byte getBioType()
- ◆ short getPublicTemplateData(short publicOffset, byte[] dest, short destOffset, short length)
- ◆ byte getTriesRemaining()
- ◆ byte[] getVersion()
- ◆ boolean isInitialized()
- ◆ boolean isValidated()
- ◆ void reset()



# BioTemplate Interface

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- ◆ Matching (verify) Methods
  - ◆ short initMatch(byte[] candidate, short offset, short length)
    - ✱ Initializes the Biometric session match
  - ◆ short match(byte[] candidate, short offset, short length)
    - ✱ Continues the Biometric session match
      - ✱ MINIMUM\_SUCCESSFUL\_MATCH\_SCORE
      - ✱ MATCH\_NEEDS\_MORE\_DATA



# OwnerBioTemplate Interface

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- ◆ public interface OwnerBioTemplate
- ◆ Enrollment Methods
  - ◆ void init(byte[] bArray, short offset, short length)
  - ◆ void update(byte[] bArray, short offset, short length)
  - ◆ void doFinal()
  - ◆ void resetUnblockAndSetTryLimit(byte newTryLimit)



# SharedBioTemplate Interface

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- ◆ public interface SharedBioTemplate
- ◆ A design guideline
- ◆ Only exposes query and matching methods of BioTemplate
- ◆ For 'shareable' client applet access from server applet via a proxy

