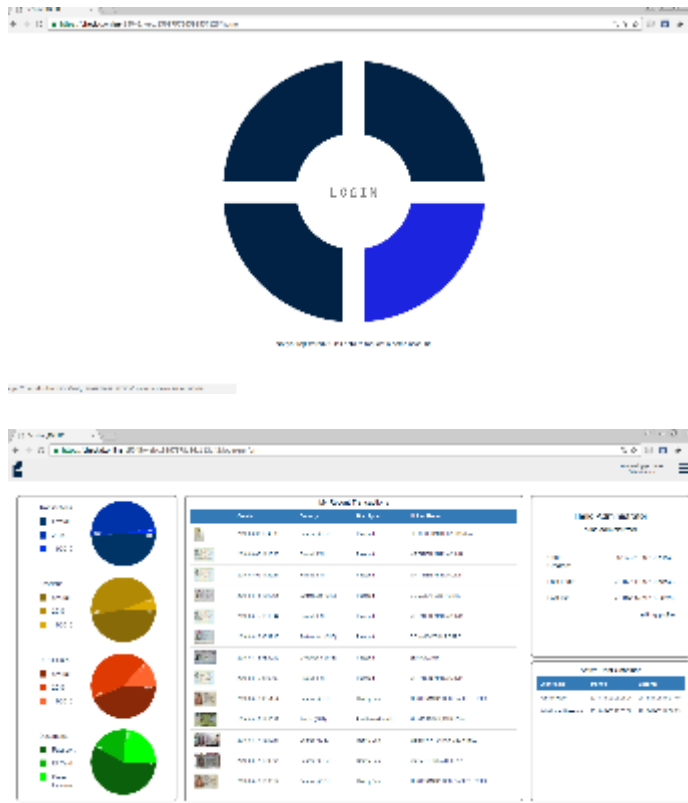


# THE TECHNOLOGY



# Genuine-ID – HUB/CLOUD



- Server Management Browser Application to account, transactions, users etc.
- Demo Browser Application to demonstrate REST API & functionality, which supports:
  - Document upload
  - Capturing documents (requires local capture component)
  - Document verification
  - Online REST API documentation
- Requirements Server
  - Min: Intel I7 4x 2,0Ghz, 32GB RAM
  - HDD/SSD: 500GB available disk space for software and transaction database
  - Virtual Machines are supported
- Requirements Client
  - Supported Browsers: IE, FireFox, Chrome
  - For capturing with devices:
    - Minimum: Intel i3 2x, 1,8Ghz, 4GB RAM, USB 2.0 for device connection
    - Document reader, Flab Bed scanner, FULL HD Web Cam
    - MS WINDOS 7/10 prof. 32/64 bit



# Genuine-ID – MOBILE



- Capture SDK for reading MRZs and capturing ID documents including quality control to be send to the HUB Server
- Demo Apps for
  - MRZ reading
  - Document Capturing and verification (requires access to JenID CLOUD Server)
- Requirements:
  - Android: min. API level: 13 (Android 4.2); recommended API level: 21 (Android 5.0) or higher (API level 23 (Android 6.0))
  - min. 2GB RAM preferable 4GB working memory
  - CPU: min. 2 core 1,0GHz ARM CPU preferable 4 Core 2,5Ghz ARM CPU; Supported instruction sets: ARMABI, ARMABI -v7a
  - Intel Atom processor 2 Core, 1,2GHz
  - min 1920x1080 Full HD camera with sharp optic and auto focus function



# DOCUMENT TYPES

TD-1 „CC-Format“



Today's standard ID format:

- ID Cards
- Drivers Licenses
- Resident Permits
- Car License Cards
- ....

TD-2 „Legacy-ID Card Format“



Legacy ID format:

- German ID Cards
- France ID Cards
- Visas

TD-3 „Passport-Format“



Standard MRP format:

- World Wide Passports



# PROCESSING WORKFLOW

Capture



Calculate Format

TD-1  
TD-2  
TD-3  
?

Classification



Read Data  
OCR



Feature Check



Result Generation

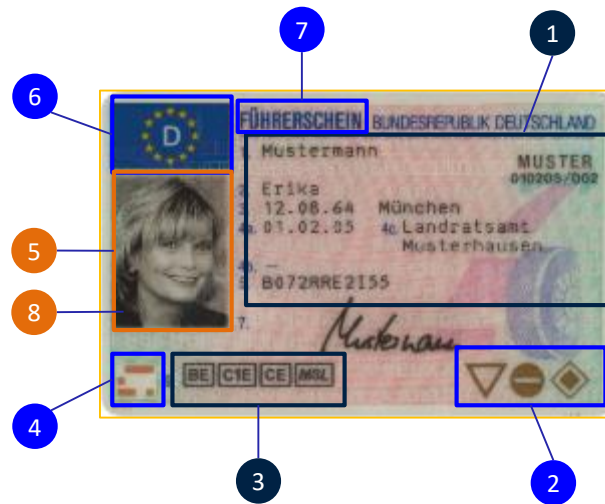




## 2 ID Verification



Front side of a German driver license



# VERIFICATION

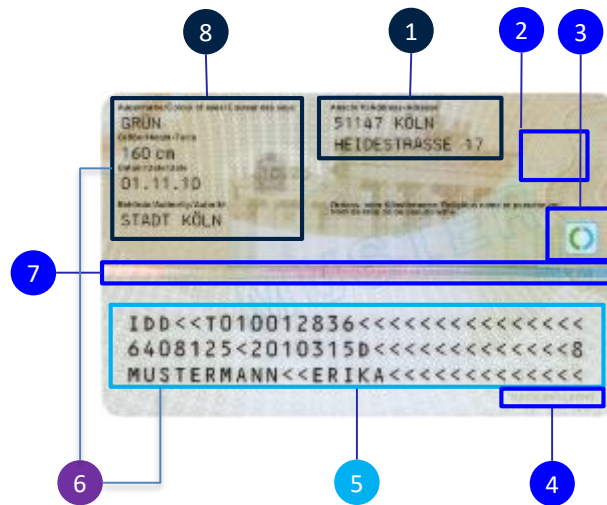
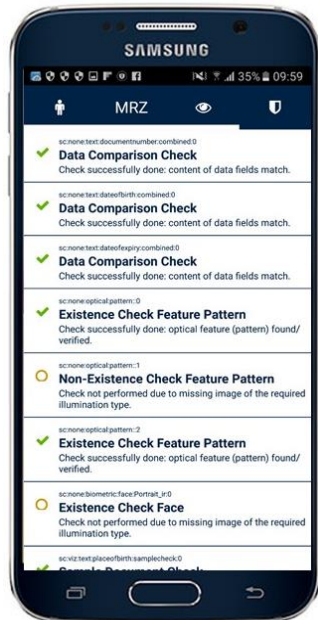
- 1 Visual Inspection Zone (VIZ)**
  - Data is extracted and provided to customer application
  - It is checked that the document is NOT a sample document
- 2 Optical Feature existence check**
  - Existence of the pattern is checked
- 3 VIZ Data**
  - Extracting and providing driving license classes
- 4 Optical Feature existence check**
  - Existence of the pattern is checked
- 5 Biometric Feature existence check**
  - Existence of the photograph is checked
- 6 Optical Feature existence check**
  - Existence of the pattern is checked
- 7 Optical Feature existence check**
  - Existence of the pattern is checked
- 8 Biometric Facial Matching**
  - Congruency of the photograph with an live captured face image is checked



# VERIFICATION

## 2 ID Verification

Back side of a German ID card

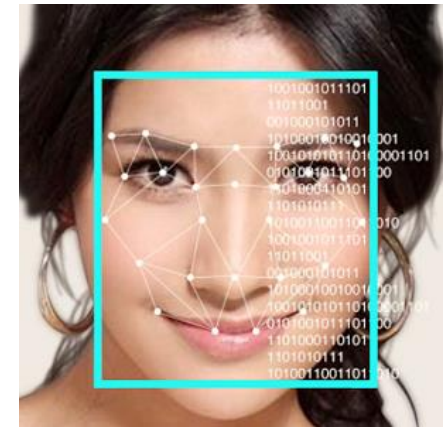
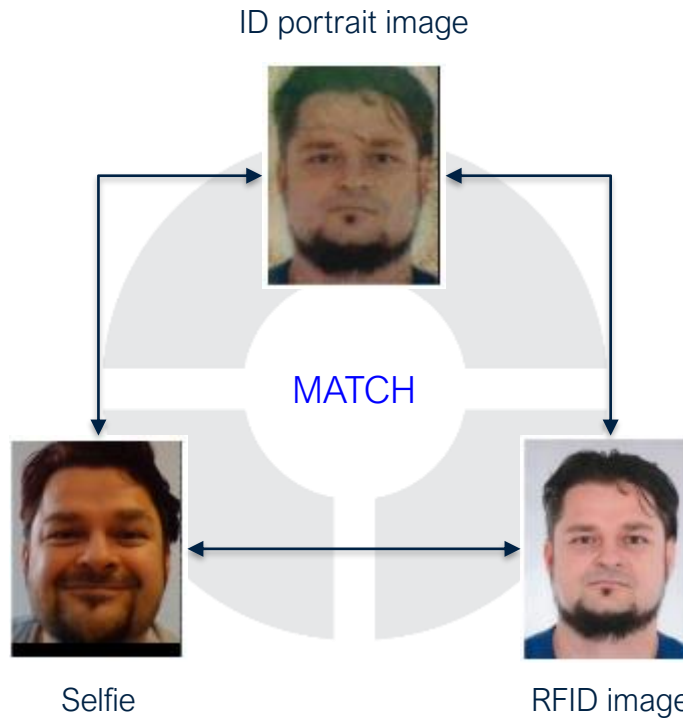
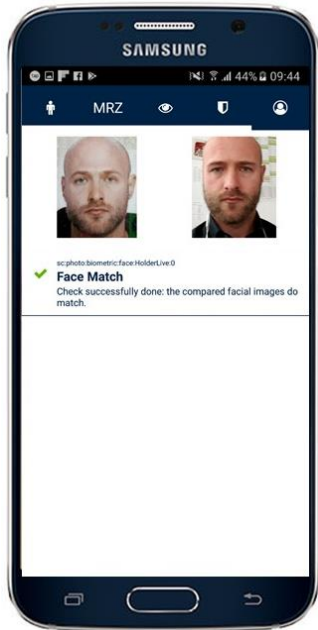


- 1 VIZ Data
  - Extracting and providing address data
- 2 Optical Feature existence check
  - Existence of substrate structure
- 3 Optical Feature existence check
  - Existence of the pattern is checked
- 4 Optical Feature existence check
  - Existence of the pattern is checked
- 5 MRZ Data
  - MRZ Data and MRZ checksums are checked
- 6 Data cross check
  - Validates MRZ and VIZ data against each other
- 7 Optical Feature existence check
  - Existence of the pattern is checked
- 8 VIZ Data
  - Extracting and providing data



# BIOMETRIC VERIFICATION

## 3 Face Matching





# LIVENESS DETECTION

## 4 Face Matching – Liveness Detection

To ensure that people being checked really provide live facial images (and not just a picture of their faces) our software requires them to do the following during the face capturing process:

- to blink and to close their eyes for a time period specified by the algorithm;
- to smile.

If these two activities are not done by the person being checked, the entire ID verification process will be stopped.





# COPY DETECTION

## 5 Verification – Copy Detection

To ensure that documents being checked really captured from original documents (and not just a copy or a screen shot) our verification engine is able to detect:

- Images capture from copies (e.g. from an MFP device)
- Images captured from a Screen.

Both cases will lead to a verification failure state and the application can decided how to proceed further with the transaction.





# MANIPULATION DETECTION

## 6 Verification – Manipulation Detection

To ensure that documents being checked are original and have no manipulated areas our verification engine is able to detect manipulations like:

- Glued photos
- Glued stickers (e.g. name)

A detected manipulation will lead to a verification failure state and the application can decide how to proceed further with the transaction.





# NFC READING & VERIFICATION

## 6 Verification – NFC Reading

To provide best security and data quality we can optionally read the NFC chip of electronic ID documents (e.g. Passports)

- Reading DG1 and DG2 of all ICAO Doc9303 compliant NFC chips
- Verify ISO 7816 and ICAO Doc9303 security protocols

All data are used to perform cross verifications e.g. live captured image against photo stored on the chip.

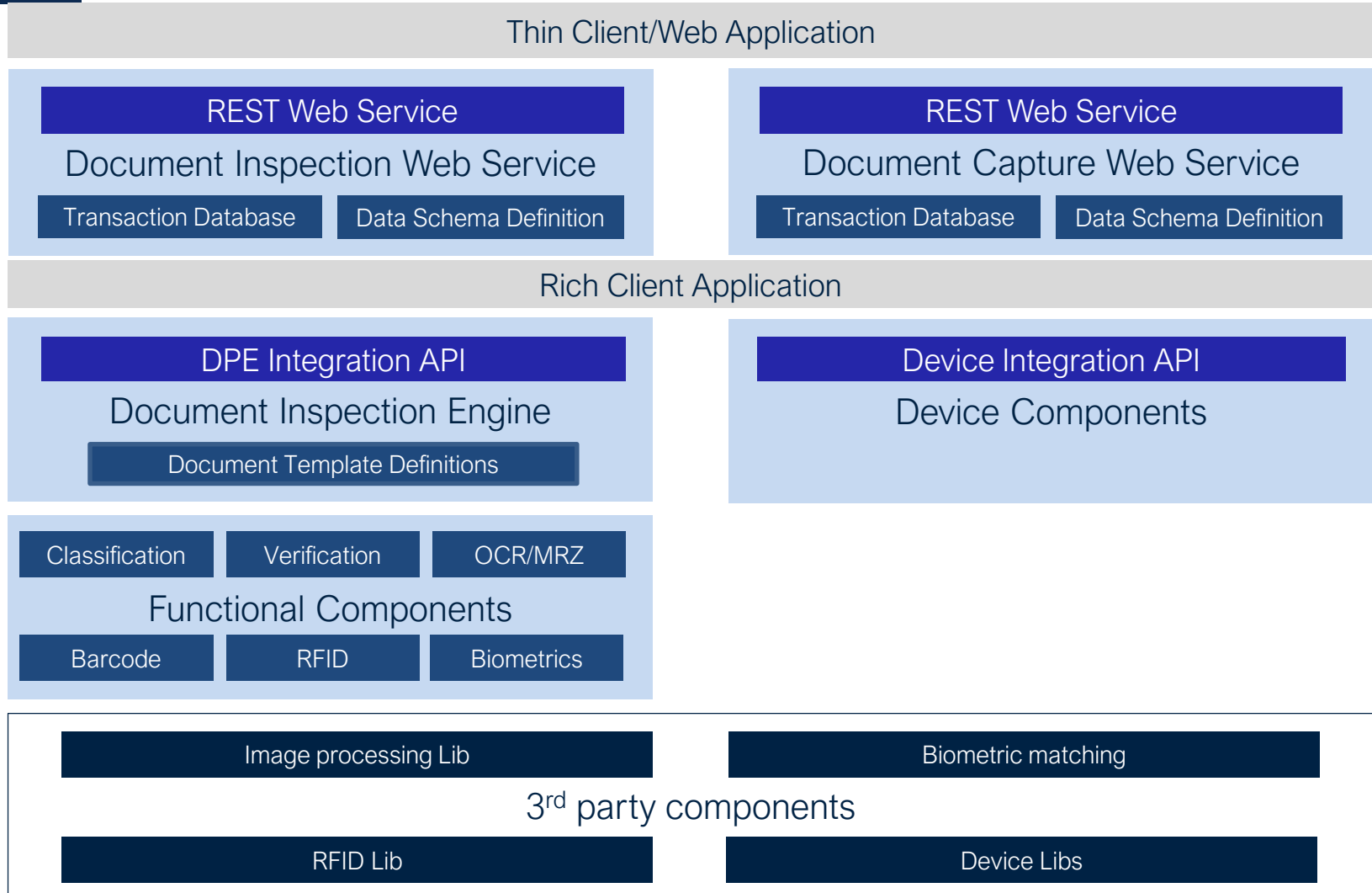


- ✓ Access Control
- ✓ Personal Information
- ✓ Face Image



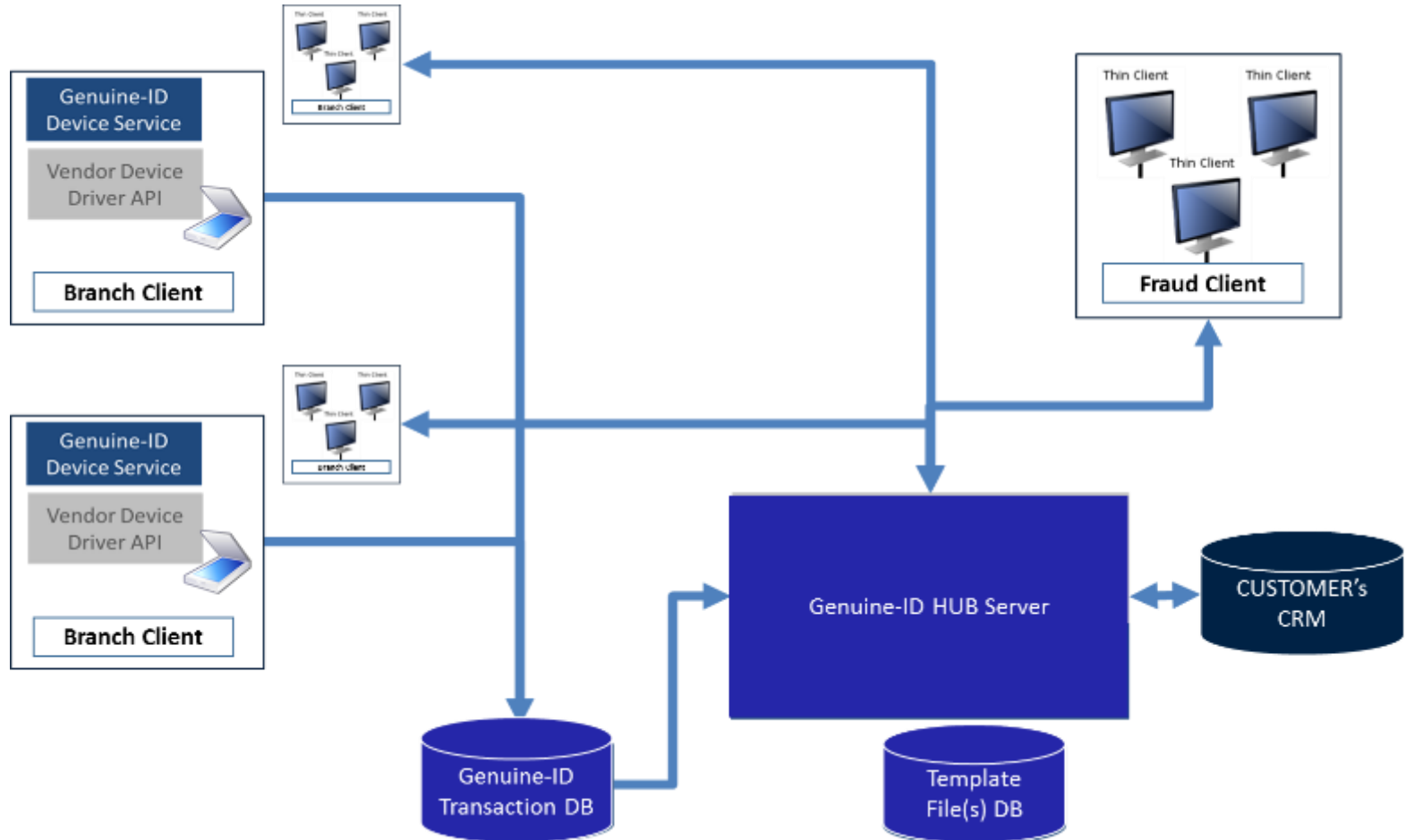


# ARCHITECTURE



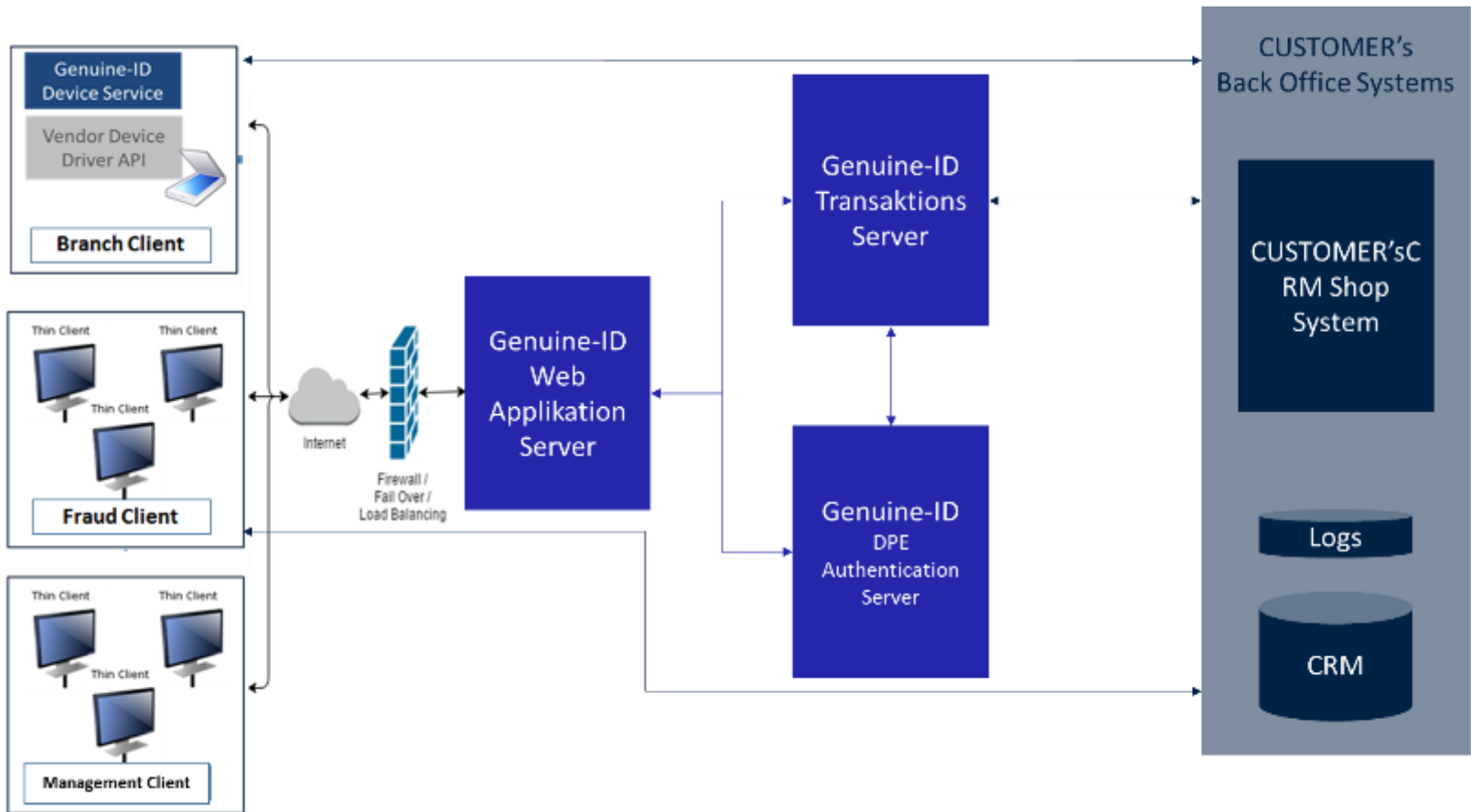


# HUB SYSTEM ARCHITECTURE





# HUB INSTALLATION





# TECHNOLOGY

- C/C++: used for all functional components and LAB SDK
- Android Native SDK & Java: Android Capture SDK & Demo Apps
- Python/Eve: HUB Server application
- HTML 5 / Bootstrap: HUB Server and online Web App
- Apache Web Server: HUB Server application
- Mongo DB: used for the transaction database
- Machinelearning frameworks: HALCON, Tensorflow, Keras
- XML/JSON : used for document templates and verification results





# CLASSIFICATION



- Sample Based Image Document classification algorithm
- Robust against: rotation, size and resolution
- Texture and color based feature set
- SBI is capable of differentiating thousands of classes (documents)
- Short and constant training time
- Only 1 sample document needed for teaching
- Algorithm speed is independent from amount of templates N
- Invariant to scale, rotation, tilt, and deformation

## Limitations:

- No none match class



# GENUINE-ID OCR



- Character classification algorithms with integrated multi-font templates
- MRZ reader with pattern pre-classification increase processing speed in live capture modes
- Resolution independent
- Support Line Feed
- Support Spaces (variable, configurable space detection)
- Support of Capital & small letters (VIZ results translated to capital letters)
- Regular Expressions for correction
- Regular Expressions for field splitting
- Illumination Types:
  - Near Infrared
  - White Light
- Supported Character Fonts :
  - Multifont Engine
- Supported Languages :
  - Multifont Language support (Chinese, Arabic, Russian supported at extra costs)
- Limitations:
  - Min.: 13 pixel per character dimension at 300dpi
- Character detection accuracy measured on ID documents
  - OCR-B 96.9%
  - other Fonts: 81,3%

# GENUINE-ID SECURITY

## Overall:

- Security Risk Score
- Warning for missing data

## Comparator:

- MRZ-VIZ
- MRZ-RFID
- VIZ-RFID

## Brightness:

- UV, IR, WHITE LIGHT
- Check for smaller, greater, range

## Pattern:

- UV, IR, WHITE LIGHT
- Contrast based, Local Auto Shape, Local Threshold

## Interrogator:

- Existence/ none existence of features
- Date checks (equal, behind, before, period)
- Data checks (equal, greater, smaller, text comparison)
- Face Check (printed vs. RFID)
- Face existence
- Sample documents

## Biometric:

- Facial printed vs. RFID (standard)
- Facial printed vs. live captured (optional)
- Facial printed vs. RFID (optional)





# Genuine-ID | Devices

Genuine-ID is completely hardware-agnostic

- No direct integration into verification component
- Common capture interface for all devices
- Support of multiple resolutions
- Support of multiple image formats
- Support of multiple Illumination Types:
  - Near infrared
  - White light
  - Ultraviolet
  - Coaxial
  - Hi-Res
- Support of electronic data reading



**DESKO**

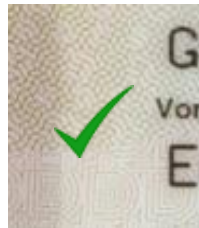
**ACCESS** IS  
Interfacing Solutions

**CROSSMATCH**

**ARH**  
ANALYTICAL RESEARCH TECHNOLOGY



# IMAGE REQUIREMENTS



## Resolution:

- Minimum capture device resolution FULL HD
- Minimum Image Resolution 260 DPI Optimal: 300-400DPI

## Quality:

- Sharp
- No image noise
- No high compression
- Glare free
- No rotation
- No additional edges
- Correctly cropped



# GENUINE-ID | TEMPLATE DB

Backed-up: a comprehensive ID template database

- Generic all ICAO documents:
  - MRZ Checksum
  - Photo interrogator (passports only)
  - UV Brightness
  - Expiry Date
  - VIZ generic as defined in Keesing with with no special training
- Most recent EU passports & ID documents (Front & Back)
- Teaching all EU documents country wise (Germany finished, NLD, BEL, AUT in preparation)
  - OCR VIZ (IR & White Light)
  - Printed Photo vs. RFID verification
  - IR vs. White Light
  - Pattern check (Vis, IR, UV)
- Project driven training of documents



# DATABASE LEARNING

## Backed-up: a comprehensive ID template database

- Tool based on partially automated training
- The system learns through:
  - OCR
  - Barcodes
  - Features
  - Meta information
- Only one sample is required for the system to classify the document
- OCR and feature training: 10-20 different customized samples are typically used to ensure optimal results
- Creation of image variations possible if no samples are available
- Creation of image variations possible if no samples are available
- Resolution independent, optimal resolution 350-600dpi to achieve optimal results with standard document readers





# SOFTWARE DEVELOPMENT KIT



- Available for BRIEF, LAB, HUB
- Easy to integrate APIs:
  - C interfaces for desktop applications
  - Java interface for mobile App development
  - REST API to integrate HUB/CLOUD Server into Web Application Mobile Application
  - Check ID Result available in XML, JSON and BSI TR3135 specific XML format
- HTML documentation including code snippets and sample applications available
- Demo software: EasyCheck and Web based HUB/CLOUD demo available





# RESULT STRUCTURE

```
<documentresult>
  <header>
    <id>D-ID-8- BACK</id>
    <name>German ID card front side</name>
    <keesingid>DEU_I8</keesingid>
    <widthInMM>85.6</widthInMM>
    <heightInMM>54</heightInMM>
    <overallriskvalue>40</overallriskvalue>
    <standardData>
      <surname>Mustermann</surname>
      <givenname>Erika</givenname>
      ...
    </standardData>
  </header>
  <body>
    ....
  </body>
</documentresult>
```

- HEADER section:
  - Document ID and name
  - Processing Status
  - Riskvalue
  - Meta data of document
  - Standard OCR data
- BODY section:
  - ROI Fields
  - OCR Data
  - Verification results
- For double sided documents:
  - Front and Back in two document result sections
  - Common BODY section with combined check results
- Field IDs are unique for each type of field



# DEVELOPMENT ROADMAP 2020

- AI based Smile and Eye blink detector
- AI based image quality evaluation
- LAB on LINUX
- AI based BLOB Verification
- AI based OVD Verification
- NFC Reading
- Java Script Capture SDK incl. Face Capture
- Deep OCR for on Device Reading (until 2021)