Smart cards can improve any transaction involving data and value. When you design your smart card system, comprehensive planning means optimal results. This guide is meant for general reference only, and does not cover every possible design step and contingency.

The First Four

1. Do you require a completely original design? Or is there an existing application that you can use? (For the latter, please visit CardLogix Smart Partners at http://www.cardlogix.com/smartpartners/)
2. Is there a clear business case? Does it include financial and consumer behavior factors?
3. Will the smart card handle data, value, or both? Adding a value function increases system design security and complexity.
4. What are the card’s essential features? With multiple functionalities, prioritize, starting with the most important one and phase in additional features incrementally.

Basic Setup

1. Will the system be single-application or multi-application?
2. Are there industry standards (e.g. ISO, EAL, or ETSI) to conform to for specific encryption or chip requirements?
3. What information do you want to store in the cards?
4. How much memory is required for the applications?
5. If the system is multi-application, how will you separate different types of data?
6. Will data be obtained from a database or loaded each time?
7. Will this data concurrently reside on a database?
8. How many smart cards will be needed?
9. Have card or infrastructure vendors been identified? What are their lead times?
10. What are the required readers, handsets, terminals, and software?
11. Is a Card Management System (CMS) necessary?
12. How many types of artwork will be included in the issuance?
13. Who will design the artwork?
14. What is needed on the card (e.g. signature panels, magnetic stripes, embossing, etc.)?

Value Applications

1. Is value in your cards reloadable or one-time use?
2. How will you distribute the cards?
3. How will cards be activated and loaded with value?
4. Will there be a refund policy?
5. What is the minimum and maximum value to store on each card?

Security

1. What are the security requirements?
2. Does all of the data need to be secure? Or only some?
3. Who will have access to this information?
4. Who will be allowed to change this information?
5. In what manner will you secure this data? (e.g. encryption, host passwords, card passwords, PINs, etc.)
6. Should keys/PINs be customer or system activated?
7. How will you identify the card issuance and versions?
8. Will the system utilize PKI and Digital Certificates? If so, how will they be managed?
9. What about security printing options? (e.g. guilloches, microprinting, holograms, hidden images, etc.)

Deployment Recommendations

1. Establish clear and achievable program objectives
2. Analyze the application and IT environment
3. Make sure the organization has a stake in the project’s success and that management buys into the program
4. Set a budget
5. Name a project manager
6. Assemble a project team and create a team vision
7. Graphically create a dataflow diagram
8. Assess the card and reader options
9. Write a detailed specification for the cards and system
10. Set a realistic schedule with inchstones and milestones
11. Establish security parameters for people and the system
12. Build your on-card and host file structures
13. Phase in each system element and test as you deploy
14. Reassess your system for security leaks
15. Deploy the first phase of cards and test the system
16. Train the key employees responsible for each area
17. Set up a system user manual
18. Check the reporting structures
19. Create contingency plans, should problems arise
20. Deploy and announce your system
21. Advertise and market your system
Smart Toolz®

Smart Toolz® is a comprehensive suite of software and hardware components that includes everything you need to develop contact and contactless memory smart card applications. The toolkit features the CardAppz® software, enabling marketing professionals to fully demonstrate a card’s capabilities within a fully configurable card database and system. Also included is the Card Configuration Utility software, allowing designers to configure a card’s parameters, load data to the card, and then communicate to the card through the supplied Winplex® middleware.

M.O.S.T. Toolz®

Designed specifically for multi-application and high security microprocessor-based smart card systems, the M.O.S.T. Toolz™ Microprocessor Card Development Kit features robust software and hardware components for rapid system development. M.O.S.T. Toolz gives you the power to deliver multiple applications and services on a single card, allowing for fast system design and easy updating without the need for card re-issuance.

Embedded Toolz™

The Embedded Toolz™ SDK includes all the components, firmware, and software you need to prototype your product’s smart cards and embedded readers. The kit comes complete with a full schematic, driver software, and source code to allow easy interfacing with your host processor and system hardware. The supplied reader chip is compatible with the widest range of smart cards and protocols available. When combined with Smart Toolz or M.O.S.T. Toolz, reading and configuring your cards is a snap.

The Embedded Toolz kit contains ten smart cards, a prototyping reader board with card sockets and USB input cable, plus a CD with sample code, schematics, manual, FAQ, and design tips.

Typical Card System

Card Configuration

- Card Configuration Utility
- M.O.S.T. Toolz
- Geode

Contact & contactless card configuration
File creation utility software
SIM card configuration software

APIs / Classes / Libraries

- Movieplex™
- Printplex™
- Trakplex™
- Winplex™

POS system for ticketing and stored value
API for card encoding and issuance
API for gaming and hospitality
General purpose API

Application Development

- CardAppz®
- Embedded Toolz™
- Manager
- VirtuoSimo™

Database demo software
Complete SDK for OEM designs
Application for making memory demos
Application tool for SIM phone browsers

Telecom Tools

CardLogix has you covered from SIM ToolKit configuration tools to complete Java SIM and handset emulation solutions. Our goal is to make tools easy to use so your design is done right the first time and gets to market faster. We offer the best of breed tools for your development project. Some of them are even free, based on production commitments. Contact your CardLogix representative to get started today.
**Middleware Support**

- PCSC industry standard API
- All standardized PIV II Middleware meeting SP800-73-1 requirements
- ImageWare Systems Card Management Systems (CMS’s)
- Intercede CMS
- MovieGold® API for Ticketing, Stored Value, and POS systems
- Printplex® API for Card Encoding and Issuance
- RSA PIV II Middleware and CMS
- SafeSign Middleware Cryptographic Service Provider (CSP)
- SafeSign Token Manager
- Worldwide Trust CMS’s
- Winplex®, a general purpose API
- Trakplex® API for Gaming and Hospitality
- Charismathics CSP and PKI Middleware

**Additional Card Options**

- Lithographic card printing
- Guilloches and rosettes
- Microprinting
- Laser engraving
- Magnetic stripes (HiCo, LoCo, and colored)
- Card punching
- Optically Variable Devices (OVD’s)
- Holograms and holomags
- Barcode printing
- Serialization and variable image printing
- Tamper-evident signature panels
- Ultraviolet inks
- Hidden images (Card Validator® graphics)
- Color shifting inks
- Colored interlayers

**Encoding Options**

CardLogix can program your card orders, including magnetic stripe encoding and software loading. Fulfillment services are available for all orders (e.g. affixing cards to special carriers, such as promotional collateral). You can also order cards serialized and inserted into envelopes that can be stamped and mailed. Card lots can also be individually sleeved or shrink-wrapped for non-secure delivery.

Our Magnetic Stripe Cards can be encoded to the industry specifications set by leading manufacturers of automated banking equipment for tracks 1, 2, and 3.

CardLogix can load Java applets and all standard types of data, such as identification records, health histories, etc. For security applications, CardLogix can also load the card with digital certificates, transport keys, and encrypted keys.

**Applet Support**

- PIV II for Identity systems
- SafeSign SSO
- ICAO passport applets
- Match on-card biometric applets
- One-time password and digital signatures for GSM phones
- SMS applets
- Emergency medical record system applet
- Navy Cash applet

**Fulfillment & Packaging Options**

- Letter and Z-fold mailing insertions
- Card wallets
- Tyvek card sleeves
- Card wallet books
- CD Connect cards
- Retail card hangers and blister packaging
- Customized shrink-wrap bundles
- Cards with peel-off coupons
- Tamper-evident packaging
Additional smart card form factors include:
- USB jump drives
- E-passports
- SD cards
- miniSD cards
- Laundry tags

CardLogix offers cards in the following substrates:
- Commercial grade
- Biodegradable grade
- Precision identity grade
- Government certified grade
- Molded ABS (for SIM cards)
### Memory Smart Cards

<table>
<thead>
<tr>
<th>CardLogix Part Number</th>
<th>User Memory</th>
<th>Issuer Memory</th>
<th>Type</th>
<th>Functionality / Applications</th>
<th>Security Features</th>
<th>Communication Protocols</th>
<th>Supported Readers*</th>
<th>Maximum Supply Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLXSA002KA2</td>
<td>2 kbits</td>
<td>NA</td>
<td>Memory</td>
<td>Small record storage, loyalty, conventions, digital receipts</td>
<td>Host-based only</td>
<td>PC</td>
<td>A, C, L, O</td>
<td>3 mA</td>
</tr>
<tr>
<td>CLXSA008KA7</td>
<td>8 kbits</td>
<td>NA</td>
<td>Memory</td>
<td>Small record storage, loyalty, conventions, digital receipts</td>
<td>Host-based only</td>
<td>PC</td>
<td>A, C, L, O</td>
<td>3 mA</td>
</tr>
<tr>
<td>CLXSA016KA8</td>
<td>16 kbits</td>
<td>NA</td>
<td>Memory</td>
<td>Data / record storage, health informatics, loyalty, conventions, digital receipts</td>
<td>Host-based only</td>
<td>PC</td>
<td>A, C, L, O</td>
<td>3 mA</td>
</tr>
<tr>
<td>CLXSA032KA9</td>
<td>32 kbits</td>
<td>NA</td>
<td>Memory</td>
<td>Data / record storage, health informatics, loyalty, conventions, digital receipts</td>
<td>Host-based only</td>
<td>PC</td>
<td>A, C, L, O</td>
<td>3 mA</td>
</tr>
<tr>
<td>CLXSA064KA3</td>
<td>64 kbits</td>
<td>NA</td>
<td>Memory</td>
<td>Data / record storage, health informatics, loyalty, conventions, digital receipts</td>
<td>Host-based only</td>
<td>PC</td>
<td>A, C, L, O</td>
<td>3 mA</td>
</tr>
<tr>
<td>CLXSA128KA4</td>
<td>128 kbits</td>
<td>NA</td>
<td>Memory</td>
<td>Data / record storage, health informatics, loyalty, conventions, digital receipts</td>
<td>Host-based only</td>
<td>PC</td>
<td>A, C, L, O</td>
<td>3 mA</td>
</tr>
<tr>
<td>CLXSA256KA5</td>
<td>256 kbits</td>
<td>NA</td>
<td>Memory</td>
<td>Data / record storage, health informatics, loyalty, conventions, digital receipts</td>
<td>Host-based only</td>
<td>PC</td>
<td>A, C, L, O</td>
<td>3 mA</td>
</tr>
<tr>
<td>CLXSA512KD5</td>
<td>512 kbits</td>
<td>NA</td>
<td>Memory</td>
<td>Data / record storage, health informatics, loyalty, conventions, digital receipts</td>
<td>Host-based only</td>
<td>PC</td>
<td>A, C, L, O</td>
<td>3 mA</td>
</tr>
<tr>
<td>CLXSM001MD1</td>
<td>1 Mbit</td>
<td>NA</td>
<td>Memory</td>
<td>Data / record storage, health informatics, loyalty, conventions, digital receipts</td>
<td>Host-based only</td>
<td>PC</td>
<td>A, O</td>
<td>3 mA</td>
</tr>
<tr>
<td>CLXSM004MF1</td>
<td>4 Mbits</td>
<td>NA</td>
<td>Memory</td>
<td>Data / record storage, health informatics, loyalty, conventions, digital receipts</td>
<td>Host-based only</td>
<td>PC</td>
<td>Custom</td>
<td>3 mA</td>
</tr>
<tr>
<td>CLXSA001KK1</td>
<td>1 kbits</td>
<td>644 bits</td>
<td>Smart Memory</td>
<td>Access control, stored value, data / record storage, health informatics, loyalty</td>
<td>Read / write password protection</td>
<td>7816 Synchronous</td>
<td>A, C, L, O</td>
<td>3 mA</td>
</tr>
<tr>
<td>CLXSA001KK2</td>
<td>1.5 kbits</td>
<td>644 bits</td>
<td>Smart Memory</td>
<td>Access control, stored value, data / record storage, health informatics, loyalty</td>
<td>Read / write password protection</td>
<td>7816 Synchronous</td>
<td>A, C, L, O</td>
<td>3 mA</td>
</tr>
<tr>
<td>CLXSA002KK3</td>
<td>2 kbits</td>
<td>644 bits</td>
<td>Smart Memory</td>
<td>Access control, stored value, data / record storage, health informatics, loyalty</td>
<td>Read / write password protection</td>
<td>7816 Synchronous</td>
<td>A, C, L, O</td>
<td>3 mA</td>
</tr>
<tr>
<td>CLXSA001KL1</td>
<td>1 kbit</td>
<td>2 kbits</td>
<td>Smart Memory</td>
<td>Access control, stored value, data / record storage, health informatics, loyalty</td>
<td>Security code, fuse lock, write protect</td>
<td>7816 Synchronous</td>
<td>A, C, L, O, S</td>
<td>5 mA</td>
</tr>
<tr>
<td>CLXSA004KK4</td>
<td>4 kbits</td>
<td>2 kbits</td>
<td>Smart Memory</td>
<td>Access control, stored value, data / record storage, health informatics, loyalty</td>
<td>Read / write password protection</td>
<td>PC &amp; T=0</td>
<td>A, C, L, O, S</td>
<td>5 mA</td>
</tr>
<tr>
<td>CLXSA008KK5</td>
<td>8 kbits</td>
<td>2 kbits</td>
<td>Smart Memory</td>
<td>Access control, stored value, data / record storage, health informatics, loyalty</td>
<td>Read / write password protection</td>
<td>PC &amp; T=0</td>
<td>A, C, L, O, S</td>
<td>5 mA</td>
</tr>
<tr>
<td>CLXSA016KK6</td>
<td>16 kbits</td>
<td>2 kbits</td>
<td>Smart Memory</td>
<td>Access control, stored value, data / record storage, health informatics, loyalty</td>
<td>Read / write password protection</td>
<td>PC &amp; T=0</td>
<td>A, C, L, O, S</td>
<td>5 mA</td>
</tr>
</tbody>
</table>

*Winplex supported reader brands: ACS, Cardcom, D Tech, Omnicly, JCM

### Contactless Smart Cards

<table>
<thead>
<tr>
<th>CardLogix Part Number</th>
<th>User Memory</th>
<th>Manufacturer Description</th>
<th>Manufacturer Part Number*</th>
<th>Functionality / Applications</th>
<th>Security Features</th>
<th>Communication Protocols</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLXRN004KP3</td>
<td>0.5 Byte</td>
<td>Crypto RF</td>
<td>AT - AT88SC0404CRF</td>
<td>Building access, transportation, purse / wallet, and stored value</td>
<td>Anti-collision, authentication</td>
<td>ISO 14443 B</td>
</tr>
<tr>
<td>CLXRN008KP4</td>
<td>1.8 Byte</td>
<td>Crypto RF</td>
<td>AT - AT88SC0808CRF</td>
<td>Building access, transportation, purse / wallet, and stored value</td>
<td>Anti-collision, authentication</td>
<td>ISO 14443 B</td>
</tr>
<tr>
<td>CLXRN16KP5</td>
<td>2.5 Byte</td>
<td>Crypto RF</td>
<td>AT - AT88SC1616CRF</td>
<td>Building access, transportation, purse / wallet, and stored value</td>
<td>Anti-collision, authentication</td>
<td>ISO 14443 B</td>
</tr>
<tr>
<td>CLXRN32KP6</td>
<td>4.1 Byte</td>
<td>Crypto RF</td>
<td>AT - AT88SC3216CRF</td>
<td>Building access, transportation, purse / wallet, and stored value</td>
<td>Anti-collision, authentication</td>
<td>ISO 14443 B</td>
</tr>
<tr>
<td>CLXRN64KP7</td>
<td>8.1 Byte</td>
<td>Crypto RF</td>
<td>AT - AT88SC6416CRF</td>
<td>Building access, transportation, purse / wallet, and stored value</td>
<td>Anti-collision, authentication</td>
<td>ISO 14443 B</td>
</tr>
<tr>
<td>CLXRN128KP8</td>
<td>16.3 Byte</td>
<td>Crypto RF</td>
<td>AT - AT88SC12816CRF</td>
<td>Building access, transportation, purse / wallet, and stored value</td>
<td>Anti-collision, authentication</td>
<td>ISO 14443 B</td>
</tr>
<tr>
<td>CLXRN512KN1</td>
<td>6.4 Byte</td>
<td>MIFARE Ultralight</td>
<td>NX - MF0 IC U1</td>
<td>Building access, transportation, purse / wallet, and stored value</td>
<td>Anti-collision</td>
<td>ISO 14443 A</td>
</tr>
<tr>
<td>CLXRN512KN2</td>
<td>3.2 Byte</td>
<td>MIFARE Mini</td>
<td>NX - MF1 IC S20</td>
<td>Building access, transportation, purse / wallet, and stored value</td>
<td>Anti-collision, authentication</td>
<td>ISO 14443 B</td>
</tr>
<tr>
<td>CLXRN512KN3</td>
<td>1.6 Byte</td>
<td>MIFARE STD (Classic)</td>
<td>NX - MF1 IC S50</td>
<td>Building access, transportation, purse / wallet, and stored value</td>
<td>Anti-collision, authentication</td>
<td>ISO 14443 B</td>
</tr>
<tr>
<td>CLXRN512KN4</td>
<td>4.1 Byte</td>
<td>MIFARE STD (Classic)</td>
<td>NX - MF1 IC S70</td>
<td>Building access, transportation, purse / wallet, and stored value</td>
<td>Anti-collision, authentication</td>
<td>ISO 14443 B</td>
</tr>
<tr>
<td>CLXRN512KN5ED</td>
<td>4.1 Byte</td>
<td>MIFARE DESFire</td>
<td>NX - MF3 IC D40</td>
<td>Building access, transportation, purse / wallet, and stored value</td>
<td>Anti-collision, authentication</td>
<td>ISO 14443 A</td>
</tr>
</tbody>
</table>

*Manufacturers: AT = Atmel, NX = NXP
### Credentys® Dual-Interface Cards

<table>
<thead>
<tr>
<th>CardLogix Part Number</th>
<th>User Memory</th>
<th>Operating System</th>
<th>Functionality / Applications</th>
<th>Supported Algorithms</th>
<th>Communication Protocols</th>
<th>Applets In ROM</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLXSU512KJ3/DIJ</td>
<td>72 kBytes</td>
<td>Java Card Platform 2.2.1, Global Platform 2.1.1</td>
<td>National ID programs, healthcare, informatics, driver licenses, voter registration, enterprise IDs</td>
<td>AES-128, MD5, DES, TDEA, RSA-1024, RSA-2048, SHA-1, SHA-256</td>
<td>T=0, T=1, ISO 14443 B</td>
<td>Pv I, SafeSign</td>
</tr>
<tr>
<td>CLXSU001MJ4/DIJ</td>
<td>128 kBytes</td>
<td>Java Card Platform 3.0, Global Platform 2.2.1</td>
<td>National ID programs, healthcare, informatics, driver licenses, voter registration, enterprise IDs</td>
<td>AES-128, AES-192, AES-256, MD5, DES, TDEA, RSA-1024, RSA-2048, SHA-1, SHA-256, ECC-163, ECC-233, ECC-283</td>
<td>T=0, T=1, ISO 14443 B</td>
<td>Pv I, SafeSign</td>
</tr>
</tbody>
</table>

### M.O.S.T.® (Microprocessor-Based) Cards

<table>
<thead>
<tr>
<th>CardLogix Part Number</th>
<th>User Memory</th>
<th>Functionality / Applications</th>
<th>Security Features</th>
<th>Communication Protocols</th>
<th>Maximum Supply Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLXSU064KJ4/T=0ED</td>
<td>8 kBytes</td>
<td>Multifunction, purse / wallet, identity, e-commerce, and campus</td>
<td>Authentication, purse, DES, and 3DES encryption</td>
<td>T=0</td>
<td>3 mA</td>
</tr>
<tr>
<td>CLXSU128KJ4/T=0ED</td>
<td>16 kBytes</td>
<td>Multifunction, purse / wallet, identity, e-commerce, and campus</td>
<td>Authentication, purse, DES, and 3DES encryption</td>
<td>T=0</td>
<td>3 mA</td>
</tr>
<tr>
<td>CLXSU256KJ4/T=0ED</td>
<td>32 kBytes</td>
<td>Multifunction, purse / wallet, identity, e-commerce, and campus</td>
<td>Authentication, purse, DES, and 3DES encryption</td>
<td>T=0 with PTS</td>
<td>3 mA</td>
</tr>
<tr>
<td>CLXSU512KJ4/T=0ED</td>
<td>64 kBytes</td>
<td>Multifunction, purse / wallet, identity, e-commerce, and campus</td>
<td>Authentication, purse, DES, and 3DES encryption</td>
<td>T=0 with PTS</td>
<td>3 mA</td>
</tr>
<tr>
<td>CLXSU256KJ4/T=0ED</td>
<td>72 kBytes</td>
<td>Multifunction, purse / wallet, identity, e-commerce, and campus</td>
<td>DSA, authentication, purse, DES, 3DES, and AES encryption</td>
<td>T=0 with PTS</td>
<td>3 mA</td>
</tr>
</tbody>
</table>

### SIM Cards (Java & Delos®)

<table>
<thead>
<tr>
<th>CardLogix Part Number</th>
<th>User Memory</th>
<th>Type</th>
<th>SIM Application Toolkit (STK) Standard</th>
<th>R-UM</th>
<th>PIM Phase 2</th>
<th>USIM</th>
<th>OTA</th>
<th>Browser Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLXS51264H0/SIV0</td>
<td>64 kbits</td>
<td>Java Card 2.21</td>
<td>GSM 11.11, GSM 11.14</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>N/A</td>
</tr>
<tr>
<td>CLXS51264H0/SIVW13O</td>
<td>64 kbits</td>
<td>Java Card 2.21</td>
<td>GSM 11.11, GSM 11.14</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>CLXS51264H0/SIV@2O</td>
<td>64 kbits</td>
<td>Java Card 2.21</td>
<td>GSM 11.11, GSM 11.14</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>CLXS001MH2/SJJ@2O</td>
<td>128 kbits</td>
<td>Java Card 2.21</td>
<td>GSM 11.11, GSM 11.14</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>CLXS001MH2/SJW13O</td>
<td>128 kbits</td>
<td>Java Card 2.21</td>
<td>GSM 11.11, GSM 11.14</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
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<tr>
<td>CLXS256K055MT14*</td>
<td>32 kbits</td>
<td>Java Card 2.21</td>
<td>GSM 11.11, GSM 11.14</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
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<td>CLXS1286F7/ID</td>
<td>16 kbits</td>
<td>Dallas Native</td>
<td>GSM 11.11, GSM 11.14</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>N/A</td>
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<tr>
<td>CLXS1286F7/DP2</td>
<td>16 kbits</td>
<td>Dallas Native</td>
<td>GSM 11.11</td>
<td>No</td>
<td>Yes</td>
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*256 kbit and 512 kbit Java-based SIMs are available with full browser support on a custom order basis.
CardLogix Corporation is absolutely committed to providing flawless products and services to our customers, in partnership with equally committed suppliers and authorized dealers.

- California C Corporation
- CA Resale SREAA 97-124323
- D&B No. 867418899
- SIC Codes 3577, 3089, 5162
- UNSPSC Code 32101617
- Harmonized Code 8542.10.0000
- NAICS Codes 334119, 326199, 334418, 334519, 42261, 51421
- CAGE Code 1KV39
- Congressional District No. 47