Linux Invention

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Title of the Invention

Method for Operating Multiple Applications on a Standard Smart Card

Description of the Invention

A slimmed down version of the Linux operating system, called Linux for Smart Cards, residing on a smart card's microprocessor, partitions the flash memory on the smart card's integrated circuit. Each partition holds an individual smart card application. Linux for Smart Cards ensures applications only access their authorized partitions and related data. Linux for Smart Cards installs and updates smart card applications, and processes and maintains data for these applications.

Problem or Opportunity

The applications available for a smart card are diverse. These applications can maintain medical and healthcare related information, banking transactions and information, transportation fares (such as subway and train fares), travel accounts and mileage tracking, and many others.

Current smart cards, however, can only run one application at a time. This means that a person must carry a number of smart cards, one for each application. What is needed is a smart card that can carry more than one application, bringing the capabilities of a smart card more towards the capabilities of a cellular phone or personal digital assistant (PDA).

Detailed Description of the Invention

For this invention, the smart card must contain an integrated circuit and an antenna. The integrated circuit must contain a microprocessor (for running a smart card version of Linux) and flash memory (nonvolatile, solid-state computer memory that can be electrically erased and reprogrammed). The antenna receives and transmits data using secure RFID (radio frequency identification) technology.

A limited version of Linux runs on these smart cards. This slim Linux version, dubbed Linux for Smart Cards, contains only the code necessary to process the functions necessary to run on smart cards; all other code for functions not needed for smart cards

(such as displaying information on a screen or interacting with printers and other external devices) is removed.

Linux for Smart Cards (operating through a secure wireless connection to a personal computer) performs these essential functions:

- Partitions the flash memory for multiple applications. Each partition runs independently.
- Employs a virtual memory mapping or another secure mapping technique (such as offset addressing) to ensure applications only access authorized partitions and related data.
- Loads applications onto the flash memory. These applications process in the same manner as they do on single application-specific smart cards.
- Upgrades and installs fixes to these applications as necessary.
- Loads and maintains data for the applications running on the smart card.
- Installs Linux for Smart Card upgrades and enhancements as necessary.

Linux for Smart Cards communicates using a secure implementation of RFID wireless technology through the smart card's antenna.

Figure 1 depicts an overview of this implementation of Linux for Smart Cards.

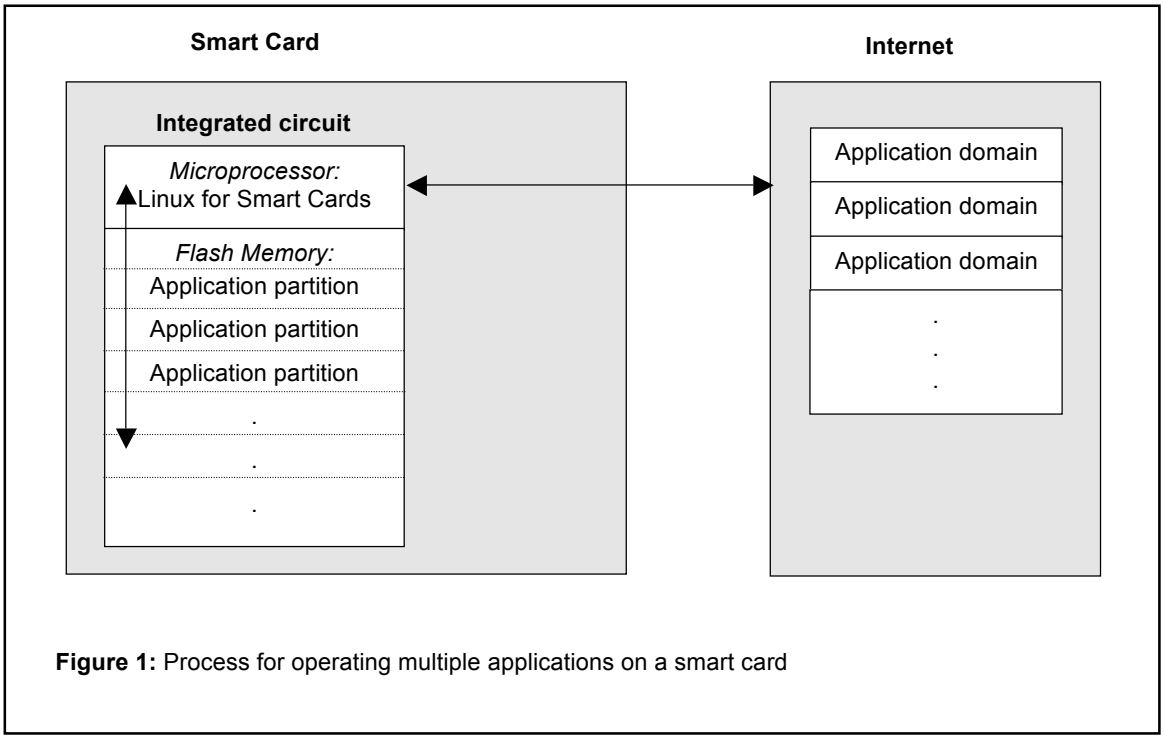

Figure 1: Process for operating multiple applications on a smart card

The method for operating multiple applications on a smart card begins when the user establishes a secure RFID connection between the smart card and the user's personal computer.

In step 1, the personal computer's Linux version loads the Linux for Smart Cards operating system onto the smart card's microprocessor.

In step 2, Linux for Smart Cards (operating through a secure wireless connection to a personal computer) first determines the size of flash memory and speed of the smart card's integrated circuit, then determines the number of individual partitions and corresponding sizes for partitioning the circuit, and presents this partitioning plan to the user for verification.

In decision step 3, the user reviews the partitioning plan, and either accepts the partitioning plan as presented or modifies the partitioning plan. If (yes) the plan is accepted, the method continues with step 6; if (no) the plan is modified, the method continues with step 4.

In step 4, Linux for Smart Cards (through a secure wireless connection to a personal computer) presents an interface for modifying the number and size of the partitions, only allowing modifications that can actually be implemented.

In step 5, the user modifies the number and size of the partitions within the limitation imposed by Linux for Smart Cards. If a modification to the number or size is entered that cannot be created due to limitations of the smart card's flash memory, Linux for Smart Cards issues an error message until the user enters amounts that can be implemented.

In step 6, Linux for Smart Cards (through a secure wireless connection to a personal computer) separates the circuit into the specified number of individual partitions and corresponding sizes. Linux for Smart Cards employs a virtual memory mapping or another secure mapping technique (such as offset addressing) to ensure applications only access authorized partitions and related data.

In step 7, Linux for Smart Cards (through a secure wireless connection to a personal computer) connects to the Internet and downloads an application to one of the smart card's flash memory partitions.

In step 8, Linux for Smart Cards (through a secure wireless connection to a personal computer) loads and maintain application data whenever that application is implemented.

In step 9, while processing data for an application, Linux for Smart Cards (through a secure wireless connection to a personal computer) downloads and installs and upgrades or fixes for the application.

In step 10, Linux for Smart Cards (through a secure wireless connection to a personal computer) checks the Linux Web site, then downloads and installs any upgrades or fixes for itself.

The method ends.

Figure 2 depicts the flowchart describing how Linux for Smart Cards operates multiple applications on a smart card.

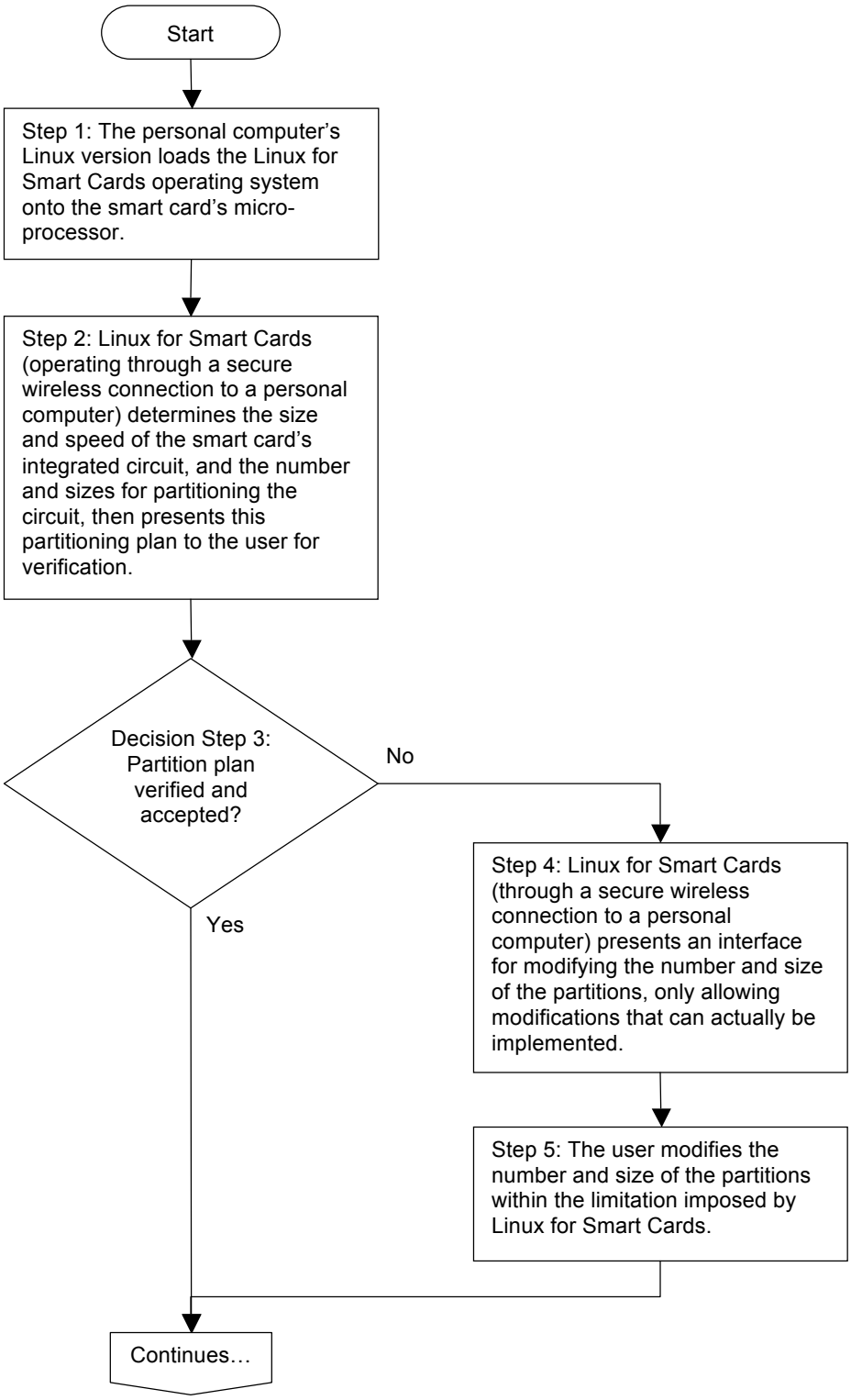

Figure 2. *Flowchart of Operating Multiple Applications on a Smart Card (1 of 2)*

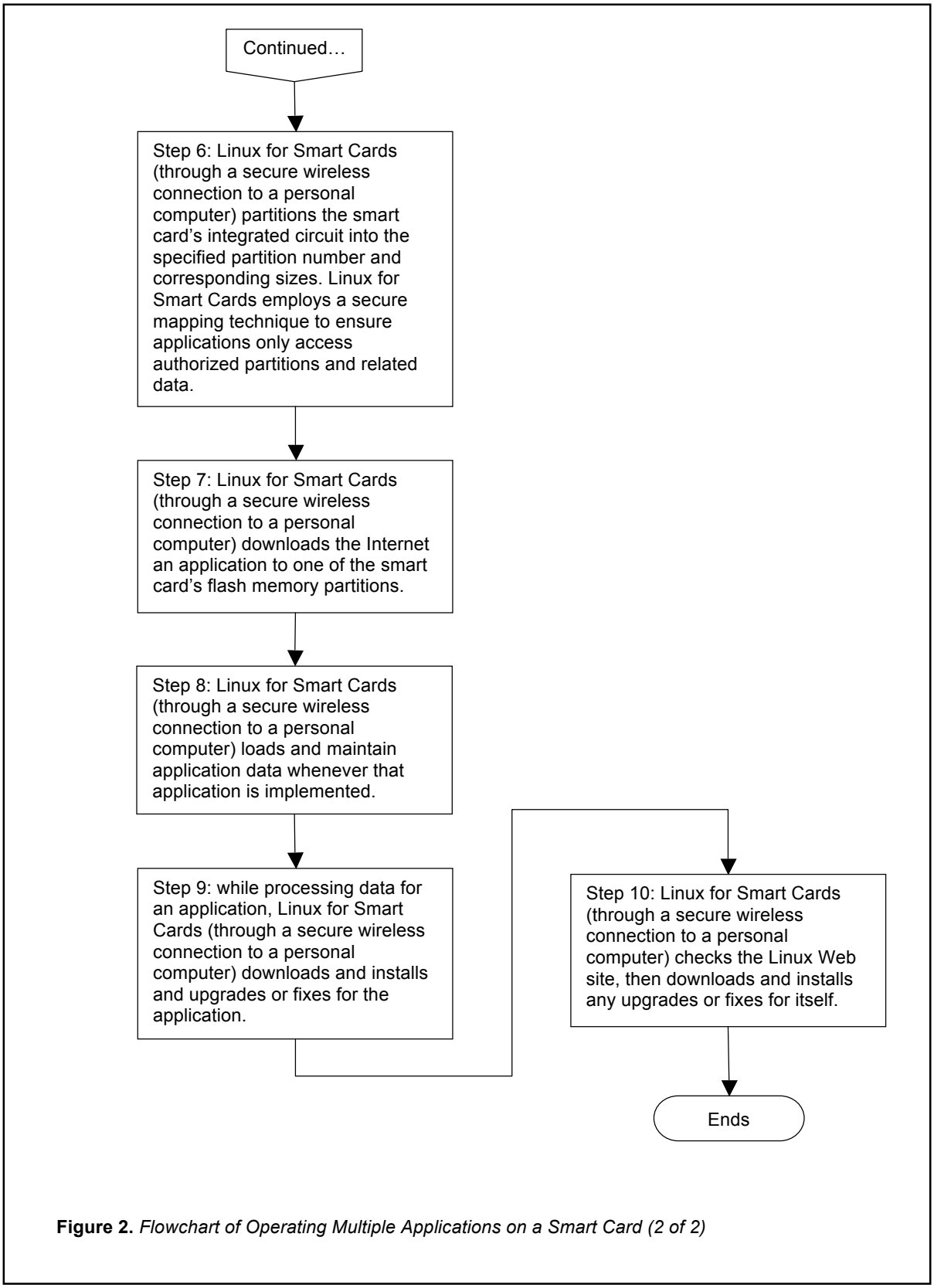

Figure 2. *Flowchart of Operating Multiple Applications on a Smart Card (2 of 2)*