Chapter 2

Contract-Based Workflow Design Patterns in M-Commerce

V.K. Murthy, University of New South Wales at ADFA, Australia

ABSTRACT

This chapter describes an object-based workflow paradigm to support long and short duration transactions in a mobile e-commerce (or m-commerce) environment. In the mobile computing environment, the traditional transaction model needs to be replaced by a more realistic model (called a “workflow model”) between several clients and servers that interact, compete, and cooperate, realising an intergalactic client-server program (ICSP). The various types of task patterns that arise in m-commerce (e-checking, shipping goods, purchasing, and market forecasting) require a subjunctive, or “what-if,” programming approach, consisting of intention and actions for trial-error design, before an actual commitment is made. Eiffel, iContract tool of Java, and UML are powerful languages to implement the intergalactic client-server program (ICSP). They provide for a software contract that captures mutual obligations through program constructs to take care of the unpredictable nature of connectivity of the mobile devices and the networks, as well as the trial and error program design required in m-commerce.
INTRODUCTION

Mobile e-commerce, or m-commerce, exploits the potential of the globally connected mobile computing environment, consisting of the Internet and mobile devices (phones, palmtops, and computers), to carry out commercial transactions—namely, collecting information, ordering goods, and ensuring payment. From a system viewpoint, the mobile computing environment consists of a mechanism for data collection and storage (D), a set of fixed or mobile server computers (S), and a set of fixed or mobile client computers (C). In general, all these objects (D, S, and C) can be mobile. The servers (S) provide mobile application services and information to clients from D. C supports query invoking and information filtering from S to provide personal information services to a user.

Three major requirements for a successful mobile computing environment are:

1. Facilities that can permit a mobile client to be connected from different access points and to stay connected during movement, ensuring mobility and locatability (called location and mobility management).
2. A good bandwidth management scheme for fast, reliable communication that is mode and data dependent.
3. The availability of battery power to operate a mobile computer. Since the battery life sets a limitation, we need some kind of facilities that will permit disconnection and save power without affecting the performance and reliability of the whole system.

The other important characteristics in a mobile computing environment are:

1. Nonsymmetrical nature of communication between mobile clients and fixed servers. The mobile clients are subject to resource limitation (power and capacity of machine and portability) unlike the servers.
2. Uncertain periods of disconnection of mobile clients for saving power or doing other tasks.
3. The mobility of client and reconnection also imply the availability of a virtual server that is available to provide an efficient service to the mobile client without the limitations of time and space.

MOBILE TRANSACTIONS

Mobility leads to communication uncertainty, and intermittent connectivity leads to conflicting demands on file system design. These result in a paradigm shift in the design of the classical client/server model, which assumes a static data access and a reliable function/data shipping between the client and server.
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