

# Mobile Agent System for Handling Criminal Cases

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## ABSTRACT

The Present global crime rate is alarming that something must be done to assist the law enforcement agencies in curbing or reducing the menace. Hence the need for Mobile Agent System for Handling of Criminal Cases. To assist the police in handling criminal cases, we have presented a mobile agent conceptual model that can migrate into databases of all the available security or law enforcement agencies. When the originating police station apprehends an offender, a search can be made for the record of the offender from its own database. If the record was not found, then the Agent can proceed to search for it at remote sites, that is, the databases of other law enforcement or security agencies by using Query Agent (QA). To get that record, Query Agent (QA) migrates from police database (host station) to remote stations (databases of other law enforcement or security agencies), negotiates with Database Agent (DA) there, and sends the required information to the host or the originating Police station. C# was used as the backend for the mobile agent migration.

**Keywords:** Police, Databases, Criminals, Crime, Agencies, Agent.

## I. INTRODUCTION

The word 'crime' is from a Latin word *crime* meaning "accusation" or "fault". There are many definitions of crime. The definition employed by any particular scholar has to do more with his/her area of specialization. Different scholars give different explanations about the occurrence of crime. [1] Criminality is part and parcel of human nature and society. That is 'why no society can claim to be completely free of crimes. But the types of criminal behaviour tend to follow the pattern of social and economic development of a given society. It is therefore unexpected that a society at a low level of development tends to experience an upsurge in the rate of violent crimes such as armed robbery, politically motivated killings, and the use of illegal weapons, ethnic and religious clashes, murder, manslaughter, attempted murder, assault, rape and likes [2]. Crime is the breach of rules or laws for

which some governing authority via mechanisms such as legal systems) can ultimately prescribe a conviction. Crimes may also result in cautions or be unenforced. While every crime violates the law, not every violation of the law counts as a crime; for example breaches of contract and of other civil law may rank as "offences" or as "infractions". Modern societies generally regard crimes as offences against the public or the state, as distinguished from torts (wrongs against private parties that can give rise to a civil cause of action). Increase in violent crime and delinquency has become a common feature of many countries. A picture of the top ten countries with the highest crime rate in the world is presented in Table 1.

**Table 1.** Top Ten Countries with Highest Crime Rate in the World

(Source: mapsofworld.com)

SN	Country	Crime Rate
1	U.S.A	11,877,218
2	United Kingdom	6,523,706
3	Germany	6,507,394
4	France	3,771,850
5	Russia	2,952,370
6	Japan	2,853,739
7	South Africa	2,683,849
9	Canada	2,516,918
10	Italy	2,231,550
12	India	1,764,630

This rate is alarming that something must be done to assist the law enforcement agencies in curbing or reducing the menace called crime, hence the need for Mobile Agent System for Handling of Criminal Cases.

A mobile agent represents a program capable of migrating from one node to another in a network to perform certain designated tasks [3]. The ability to migrate code and processing functions to a remote node offers the potential benefits of reduced network traffic and bandwidth requirements. The use of mobile agents for network applications management has been proposed and investigated by several researchers in the recent years with the primary goal of reducing network traffic and building scalable systems [4]

A Mobile Agent (MA) is a composition of computer software and data which can migrate (move) from one computer to another autonomously and continue its execution on the destination computer. Taking the recent development i.e. going to this field, mobile agent-based intrusion detection system is an efficient way to the intrusion detection in the distributed environment. [5]. Mobile agents perform a task by migrating and executing on several hosts

connected to the network. For the sniffer detection, the network administrator sends some special types of mobile agents in the network and collects information from different nodes. After analysing this information the network administrator can identify the computer system running in promiscuous mode. In [6] and [7] the implications of applying mobile agent technology to the field of intrusion detection are presented. Once the system is operational, it will be the first Comprehensive real-life application using mobile agents that will not only provide security to network applications but also provide security and protection to the mobile agents' system itself.

## II. DISTINGUISHING FEATURES OF MOBILE AGENTS

These features make Mobile Agents more desirable for building mobile applications over the traditional client-server paradigm [8]. These features include:

- a. Mobile agents naturally operate in heterogeneous environments characterized by wide-area and diverse networks where either the reliability or the security assumptions of the computers and the network connections respectively are not a factor [9].
- b. The mobile agent acts autonomously on its own or on behalf of the user with the ability to precisely initiate its migration by itself and execute its owner's request and move independently from one host to another to resume execution [10].
- c. Mobile agents exhibit a multi-hop ability, that is, they can travel with their code, data, and execution state more than once by resuming their execution in another server in the network after completing their tasks in the first server visited. In contrast, mobile code is transferred only once in another mobile paradigm [11].
- d. Mobile agents heavily rely on the underlying protocol for communications by way of

interactions and message exchanges to successfully carry out and execute the certain task in the in the agent system [9]. During migration, mobile agents can communicate synchronously or asynchronously with other agents or the host systems. Others are through the network-based mechanism and local inter-process communication mechanism.

### III. RELATED LITERATURE

In this section, we reviewed literature related to Mobile Agent Systems. Mobile agents are autonomous and intelligent programs or software that are capable of moving through a network searching for and interacting with the resources on behalf of its user or network administrator [12], [13], [14], [15], [16], [17]. A mobile agent is an executable program that can migrate from one computer to another, at times, of its own choosing in a network. This means that a mobile agent is free to travel to any place in the network. It can execute without requiring a link with or being controlled from the originating location. Also, a mobile agent is an execution unit that is able to migrate autonomously to another host and resume execution there, continuing from where it left off [18].

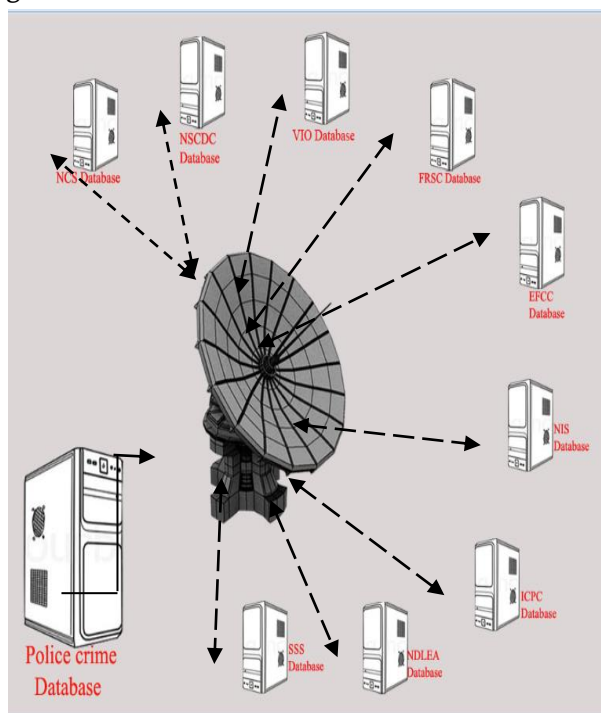
Other definition of mobile agents are presented in [19], [20], [21], [22], [23]. The mobile agent is software that can migrate from one node to another in a computer network. It can create reports about activities of software and can as well collect data [24]. A mobile agent system provides primitives allowing the agents to communicate with each other and with the servers on the visited machines. These communication primitives take the form of message passing or procedure or method calls [25].

A Mobile Agent-Based Information Retrieval System for Criminal Records was presented in [26], in the paper, the interconnection and migration of the query agent to only the police databases were presented. But in real life, criminals

are not limited to only the operational radius of the police. So there is a need to develop a mobile agent that can search for criminal records from the databases of police and migrate to the databases of other security or law enforcement becomes imperative.

### IV. ARCHITECTURE OF A MOBILE AGENT SYSTEM FOR HANDLING CRIMINAL CASES

An agent can be heterogeneous to any degree, information can be transmitted directly among agents. Communication can either be broadcast or transmitted point-to-point. The conceptual model of the Mobile Agent for handling Criminal Cases is in Figure 1.

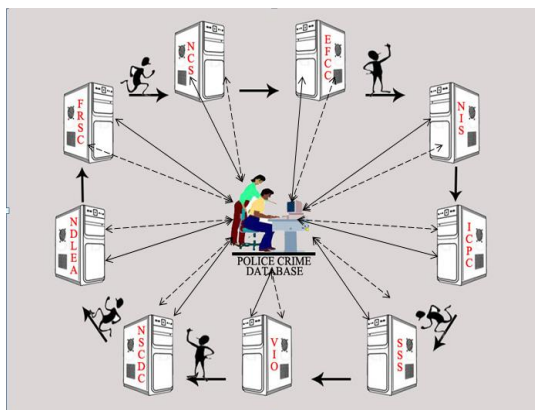


**Figure 1.** Conceptual Model of the Mobile Agent.

The conceptual Model provides a framework for the Mobile agent interaction in the system, that is, between the police database and the database of other security or law enforcement agencies such as, Nigeria Custom Services, Economic and Financial Crime Commission, Nigerian Immigration Services, Independence Corrupt Practices and other Related Offences Commission, State Security Services, Vehicle Inspection Officer, Nigerian Security and

Civil Defence Corps, National Drug Law Enforcement Agency and Federal Road Safety Commission.

In general, agent serves as a messenger between the databases of all the agencies to retrieve records about a certain criminal. To establish the level of criminality of an offender, the messenger (AGENT) searches through each database with the fingerprint of the offender as the medium of identification.



**Figure 2.** The Mobile Agent migration of the Model.

**Legend**

- NCS - Nigeria Custom Services
- EFCC - Economic and Financial Crime Commission
- NIS - Nigerian Immigration Services
- ICPC - Independence Corrupt Practices and other Related Offences Commission
- SSS - State Security Services
- VIO - Vehicle Inspection Officer
- NSCDC - Nigerian Security and Civil Defence Corps
- NDLEA - National Drug Law Enforcement Agency
- FRSC - Federal Road Safety Commission

When an offender is apprehended by the originating police station, a search can be made for the record of the offender from its own database. If it is not found, then the Agent can proceed to search for it at remote sites, that is, the databases of other law enforcement or security agencies by using Query Agent (QA). To acquire the record, Query Agent (QA) migrates from police database (host police station) to remote

stations (databases of other law enforcement or security agencies), negotiates with Database Agent (DA) there, and sends the required information to the host, Police station). With this system, it may be possible to discover that the offender is not first-time offender (Table 2), hence a user (Police officer) can determine the level of the criminality of the offender. If the offender is a first time offender or criminal then the system will register the crime committed and will also create a criminal page for the offender with a unique Identification Number (Criminal-Id), name, sex, picture, finger print, signature, in relation to the agency involved. But if the name is displayed with crime history (Table 2), the case will be documented by the police and for prosecution in a competent law court. The Agent is designed to migrate among every law enforcement agency’s database to determine the guilt and innocence of the offender. The migration of the Mobile Agent is presented in Figure 2, while the migration flow is in Figure 3. This model will reduce overhead cost, data insecurity, time wasting and redundancy in prosecution.

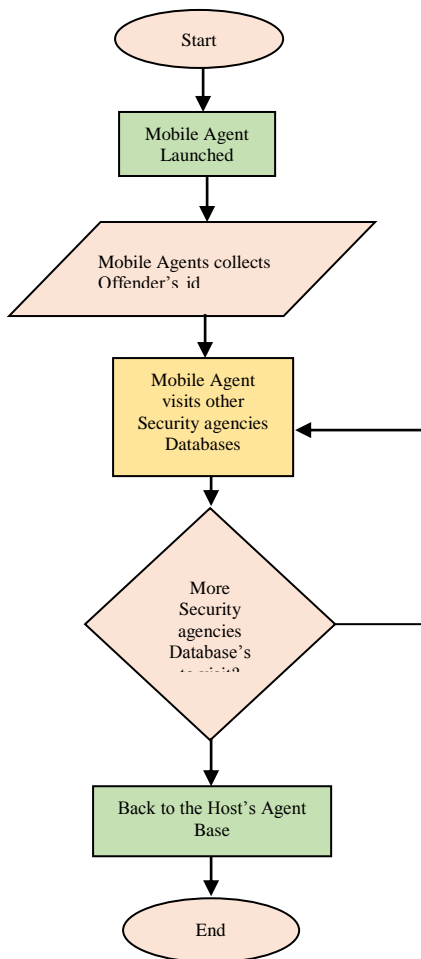
**Table 2.** Report of The Mobile Agent Search Of Databases For An Offender

S/N	Security Agencies	Offence	Date
1.	NCS	-	-
2.	EFCC	-	-
3.	NIS	-	-
4.	ICPC	-	-
5.	SSS	-	-
6.	VIO	Driving without Vehicle particulars	02/06/1999
7.	NSCDC	Bunkering	16/06/2016
8.	NDLEA	Possession of Narcotics	08/04/2004
9.	FRSC	Over-speeding	25/09/2013

**V. CONCLUSION**

In this research, we have presented a mobile agent model that is specifically designed for general handling of crime control in a society. The system is capable of handling more than one criminal case and confirmation of the criminality of an accused person at a time thereby speeding up the rate of prosecution and justice.

- a. Case output can be improved on through the use of this system (checking database for names and pictures of prosecuted criminals).
- b. Since the system at different law enforcement agent office is networked to assist in crime check, this will reduce agencies workload and crime also will be reduced drastically.
- c. The systems can also assist in decision making.



**Figure 3.** Migration flow of the Mobile Agent System

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