

## RASTRO: INTERNET BASED TRACKING SYSTEM FOR FISHERIES CONTROL

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### RESUMO

Este artigo apresenta o emprego de tecnologias OpenSource no desenvolvimento de um sistema de informações para rastreamento de embarcações da frota pesqueira. Concebido para ser operado via Internet, com acesso seguro, o sistema tem por foco central a redução de custos recorrentes associados a programas de prateleira, e na visualização de cartas temáticas via web.

### ABSTRACT

This article presents how OpenSource technology was used to develop a fishing vessels tracking system. The system operates through Internet with secure access, and has its focus on box software cost reduction as well as in thematic maps visualization via web.

Palavras-Chave: webgis, mapserver, tracking system.

### 1. INTRODUCTION

Since 1999 the offshore fishery industry in Brazil has invested expressive amounts of resources in searching for alternative deep-water commercial stocks, such as monkfish and red crab. However, the industry fleet has no tradition or either is prepared to fish in deep-waters. To cope with this problem, the Federal Government create a control program permitting rented vessels from Spain, United Kingdom, Portugal, Germany, Russia, Japan and South Korea to operate along the Brazilian coast. In order to carry out this operation, all vessels must have onboard a tracking equipment, an independent observer and to operate beyond 200 meters depth.

This paper presents how the tracking equipment works in compliance with RASTRO, an Internet based tracking system that was planned, developed and implanted to monitor fishing grounds (CABRAL, SPERB and TRIPODI, 2002). The result is a successful balance between the commercial need of the fishing industry and the responsibility of the government in controlling fishing resources.

Currently, several companies have certified equipment to provide tracking positions in compliance with RASTRO. The system collects vessels' GPS data and displays maps and reports on demand showing vessels engaged in fishing activity. System access is granted to the government for auditing purposes, and to monitors of the fishing industry who control daily operations.

### 2. SYSTEM ARCHITECTURE

Brazil is a continental country. Using the Internet was a natural choice to reach all potential users of RASTRO. The system was developed using the latest WebGIS and OpenSource technologies, combining Linux, Apache, PHP, MapServer, Oracle and Oracle Spatial (Figure 1).

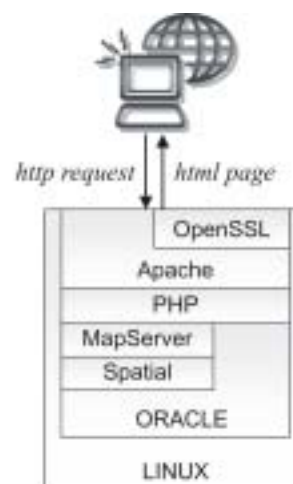


Figure 1. System Architecture.

The system is structured in two modules: data retrieval and web map navigation. Data retrieval is totally automated. All certified tracking equipments are in communication with inland servers that supply formatted vessel position information to the data retrieval module. This module processes data and stores position information in GIS enabled database – Oracle Spatial Database Objects (SDO).

Web map navigation is an interactive graphical user interface that displays layers of last positions (Figure 2) and trace data (Figure 3) on a base map. Interface functions are available according to the user profile and his or her permissions. Observers can access last 24 hours of past positions whereas government auditors have access to full position data and to PDF report generation functions.



Figure 2. Navigating in Web Maps (last positions).

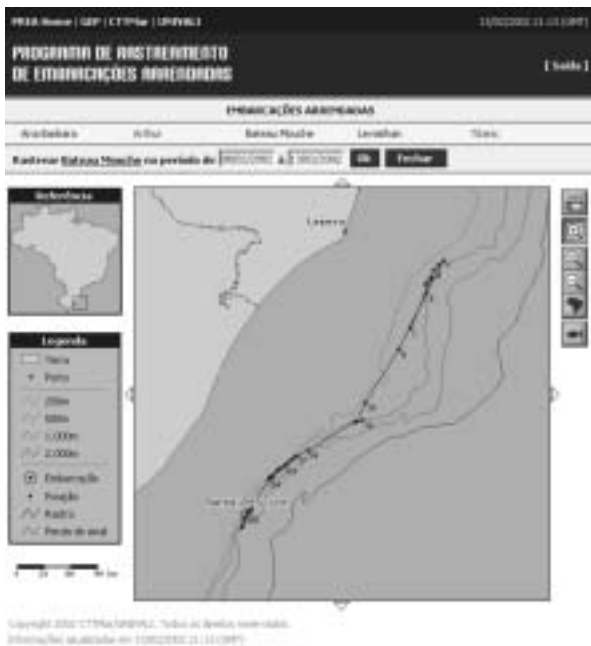


Figure 3. Trace path for a single vessel.

### 3. FUTURE WORK

Considering the multitude of commercial tracking systems available in the worldwide market, RASTRO presents itself more as a tracking center, providing position data in several levels for users, and building a strong appeal for integration of numerous tracking systems as it is currently functioning today.

The idea of integration now leads the research group to standardize tracking data capture or delivery, including not only position information, but also further measurements like temperature, salinity, depth, and others. Undergoing work is focused in setting a long lasting standard to aid the development of fishing vessel-tracking industry

in Brazil. The first draft of the standard is expected to be ready by the end of 2003. The substitution of Oracle as database for an OpenSource equivalent is also in the “future works” agenda.

### REFERENCES

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