REMOTE DEBUGGING SERVICE

Institution/Company name	Universidade do Porto - Inovaçao
Contact details	Praça Gomes Teixeira s/n Edifício Gomes Teixeira 4099-002 Porto, Portugal upin@reit.up.pt Tel: + 351 22 0408136 Fax: + 351 22 0408184
Website	http://upin.up.pt

- **Key words**

Communications - Data management - Software engineering / development

- **Description**

The present invention discloses a **method to localize software faults automatically and remotely, using an efficient technique without access to source code**. This debugging technology allows the use of remote network service on software under test, which can be composed by multiple different systems and used distributed architectures.

Background
Software is built upon source code written in a given programming language. Being a (mostly) manual task, software may have several faults, mainly on large projects. When a fault is activated at execution time, the behaviour may not be the expected one, leading to (catastrophic) failures. One of the most cumbersome and expensive tasks during software development is the localization of the root cause of failures (known to cost the US economy alone 60B dollars). Several approaches were developed to provide automatic debugging features. However, they are not easily applicable to current software systems. Some of these techniques require a complete rewrite of the source code. Moreover, almost all of these techniques require full access to the source code, that may lead to privacy issues when dealing with debugging tasks performed in third party entities. Furthermore, these techniques are not ready to be used in technological heterogeneous and/or large distributed systems.

Benefits
With this technology it is possible to fill the main gaps of the currently available automatic debugging techniques. It allows the creation of a remote debugging service that may be used with multiple technologies and systems with distributed components.
It may be used with any operating system and programming language. Due to its nature, it also guarantees the source code confidentiality because it never accesses to it (it only access to data

collected during the software runtime). This technology enables the offer of remote debugging services to the software industry, increasing efficiency and reducing costs and development time. It may be accessible from any part of the world and can be used with several different application paradigms (local applications, webapplications, mobile applications, embedded devices, and several others). According to academic and industrial studies, this technology reduces the debugging task effort in up to 75%. The users who participated in these studies found the output produced by this technology fundamental to find the software faults. This technology has a very high accuracy that may lead the software developer directly to the faulty line of code. The Remote Debugging Service is also very fast, not only because it may be used in already implemented systems without much effort, but also because it is based on fast algorithms, and because the more demanding processing is done off-site. This allows the use of this service in devices presenting low computational resources.

Applicability

The remote debugging service can be used by the entire software industry, namely on critical systems but also in all the entities who need to debug their software, namely: software houses, independent software developers, consultancy agencies, specialists from academia, etc. Any software developer is a potential user of this technology. Software developers are present in every organization that develop software to use internally or to market (software houses). Furthermore, it may also be used by teams of software testers, software debuggers, and the ITC consulting professionals (in particular, from software quality and reliability fields). Due to the architecture of this technology, it also enables the creation of a new concept: debugging as a service. The users may subscribe the service and be only charged according to the used resources. It also allows the exploration of a "Freemium" model, to boost the dissemination of this technology.

- **Applicability of Technology to Maritime SMES**

Any software developer is a potential user of this technology e.g. Environmental monitoring - Marine renewable energy - Maritime services - Oil and gas - Security - Transport and shipping - Water management - Other markets.