

# Menelaos Perdikeas

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## Summary

I am a full stack software engineer able to design and code all layers of a modern application: browser, application server, database. I have worked with a variety of technologies in all tiers. In the browser: from vanilla HTML/CSS/JavaScript, jQuery to using UI component libraries like jQuery UI or DHTMLX, to Webpack / ReactJS. In the application server I've experience with a Java stack deployed in Tomcat or JBoss servers with both presentation oriented (Spring Web MVC / JSP) and service-oriented (JAX-RS, SOAP, Restlet, Jersey, RESTEasy) applications. In the database I have experience with PostgreSQL, Oracle, MySQL and Sybase databases. I am a proficient Emacs user (with an Emacs setup that I've honed over the years for maximum productivity) and I like to live as close to the command line as possible (though I can of course also use an IDE if required).

In addition to writing the code I can handle the build system (Ant / Ivy), unit testing, static code analysis, coding standards and automatic compliance checking, code coverage, integration testing, shell-scripting, etc. I am also proficient in JavaScript (ECMAScript 6 and 7) including the Node / Babel / Webpack ecosystem and the Mocha (unit tests) and FlowType (type checking and static code analysis) tools.

My career spans almost 2 decades of software development in all manners of companies from start-ups and SMEs to world class organizations such as the [European Space Agency](#) and the [Harvard-Smithsonian Center for Astrophysics](#) (my current position).

In my free time I study Math and develop JavaScript games which you can play at: <https://mperdikeas.github.com/games.html>.

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## Awards

**2020 USA National Aeronautics and Space Administration:** Group Achievement Award to the Chandra Source Catalog 2.0 Team

**2000 Dimitris N. Chorafas Foundation:** award for best doctoral student NTUA (shared priced with one other co-recipient)

## Experience

### [Smithsonian Astrophysical Observatory](#)

#### **SW Application Specialist (developer)**

*October '16 – now*

I am working at the [Chandra Data Archive](#) at the Smithsonian Astrophysical Observatory which is part of the Harvard-Smithsonian Center for Astrophysics (Cambridge MA). I am coding primarily in Java and JavaScript but also in Python. Projects and accomplishments in this position:

- Design and implementation of the new Chandra Source Catalog web-based application. The application will allow researchers to search the Chandra Source Catalog and retrieve observations (under development). **Technologies:** HTML/CSS/JavaScript (using jQuery UI and the the DHTMLX UI library), Java (Spring Web MVC), JSP, JAX-RS (RESTEasy).
- Designed and implemented a test suite for both the front-end (presentation-oriented) and the back-end (service-oriented) components of the new Chandra Proposer system (this is the system to be used by researchers wishing to submit proposals for use rights on the Chandra X-Ray telescope). The test suite allows us to simulate a large number of concurrent users interacting with the web site and is used to stress-test both the web application itself and also the login functionality offered by the SSO mechanism (see below) **Technologies:** Python 2.7 (with the Requests library), Java
- Designed and implemented the signup and edit profile pages for the new Chandra Proposer system. **Technologies:** HTML/CSS/DHTMLX/JavaScript (jQuery UI and DHTMLX), Java, Spring Web MVC, JSP, JAX-RS (RESTEasy), Sybase.
- Designed and implemented an SSO (Single-Sign On) solution loosely based on the [CAS protocol](#). The system provides an RBAC-based Authorization and Authentication in a uniform manner for all participating applications. It also supports all features taken for granted in a modern authentication system (salted and peppered cryptographic hashes, auditing, etc.). **Technologies:** HTML/CSS/DHTMLX/JavaScript, Java, JSP, JAX-RS (RESTEasy), Sybase.
- Advocated and implemented a new team-wide build system for Java WAR and JAR applications and libraries. The new build system is based on Ant and Ivy (with a local file-system based repository) and guarantees fully reproducible builds with no Internet connectivity requirements (i.e. no dependencies are accessed or downloaded during the build). The new build system additionally includes the following features: (a) integrated testing (via JUnit) (b) detection of bugs by means

of static code analysis using two different but complementary solutions: FindBugs and PMD (c) style checker using CheckStyles to ensure code styling conformance.

**Technologies:** Ant, Ivy, FindBugs, PMD, CheckStyles

## ESAC (through Neuropublic)

### Lead Programmer and Technical Project Manager

February '16 – September '16

I was the lead coder and technical project manager for the RAWDAR/RADACER project which aimed to create a data clearing house for the telemetry of a large number (upwards of 12) of European Space Agency missions. The work was for the ESAC establishment though, unlike the previous project, it was mostly off-site.

In this project:

- I studied telemetry and telecontrol standards for recent ESA missions.
- coded a library to decode BSCS telemetry files for the BepiColombo mission telemetry format. This was done mostly to gain familiarity with the subject domain and the relevant standards.
- designed and implemented a prototype REST interface to be exposed by the unified data archive.
- designed and implemented the database and the REST server back-end of a graphical web application that displays statistics on the accumulated telemetry for the various missions.

This project did not reach production phase.

**Technologies:** Java, ReactJS, JAX-RS, PostgreSQL 9.2, PL/pgSQL, JDBC, SQL.

## ESAC (through Neuropublic)

EUROPEAN SPACE AGENCY / ESAC, MADRID, SPAIN

### Software Architect and Lead Programmer

March '13 – January '16

I was the software architect and lead coder for the [new EuroVO Registry system](#) which is scheduled to replace the [existing EuroVO Registry system](#) that had been serving the global IVOA community for the last ten (10) years.

I worked for three years with people from the [Science Archives Team](#) at ESAC, with little or no supervision and designed and implemented the entire system from scratch with the exception of most of the front-end web-based GUI (done in [GWT](#)). Among others, I designed and implemented:

- the [OAI-PMH](#) harvesting functionality. I couldn't find a reliable 3rd party OAI-PMH library so I implemented the entire protocol from scratch.

**Technologies:** Java, XPath 2.0 (Saxon), XSLT, REST (Jersey), HTTP, Tomcat 7

- the [RegTAP](#) functionality and interface. I came into the project with **zero** domain-specific knowledge and I managed to implement the second, globally, RegTAP search interface and make material contributions to the RegTAP specification itself to the extent that I was recognized as a co-author of the spec.

**Technologies:** Java, XPath 2.0 (Saxon), REST (Jersey), JDBC, Tomcat 7

- the [IVOA RI1](#) Search interface. This is a [SOAP interface](#), defined in WSDL (i.e. following a top-down approach). Due to the complexity of the XSDs used by the IVOA community I ran into problems with the automatic stub generation by tools like [XJC](#) (which I have documented in [SO](#) and raised against the tool's [JIRA](#)). So I decided to implement my own [wsimport](#)-like tool that reads WSDL and generates Java code (stubs and skeletons) to perform SOAP calls.

**Technologies:** Java, SOAP (Jersey), XSD, template-based code generation with [String Template](#)

- the [XML XSD schema-validation](#) and the IVOA validation of the various services.

**Technologies:** Java, XML, XSD, XPath 2.0 (Saxon), HTTP.

- the report, email notifications and visual plots generation subsystem.

**Technologies:** Java, [JFreeChart](#)

- the entire database schema for PostgreSQL. I wrote the DDL statements for the entire database which comprises 102 tables in 4 schemas and was responsible for the installation, fine-tuning, index creation, performance optimization, etc of the PostgreSQL database. Wrote the entire DB-facing [DAO](#) code in Java.

**Technologies:** PostgreSQL 9.2, PL/pgSQL, JDBC, SQL.

- Finally, I also handled all DevOps aspects including: installing and configuring Apache Tomcat7 and the PostgreSQL cluster, authoring the entire build system based on Ant and [Ivy](#), writing test cases (JUnit), coding standards checking with [Checkstyle](#), source code analyzers with [PMD](#) and [FindBugs](#), code coverage with [Cobertura](#), etc.

## Neuropublic S.A.

PIRAEUS, GREECE

### Senior Software Engineer

June '12 – March '13

I worked as a software engineer in the company's flagship [GAIA](#) series of cloud-based services.

Among the things I did:

- designed and developed all the server-side code for an expert system that advises farmers on the subsidies they are entitled to apply for. I devised a formal way to capture the legal requirements for each subsidy in the form of [Lisp S-expressions](#). The provisions and rules of each ministerial decision

involving subsidies are modelled in the form of a declarative, Lisp-like DSL. Then the system reads from the database the profile of each user (age, income, past subsidies, location and size of fields, crops, animal capital) and dynamically evaluates them against all possible subsidies. The system finally informs the user which subsidies (s)he can apply for (based on their circumstances and the rules encoded in each ministerial decision) and also creates a visual diagram that explains to the users why they failed to qualify for certain subsidies.

**Technologies:** Clojure (for the dynamic evaluation of the S-expressions), dynamic evaluation of Clojure code from Java, DOT (for visualizing criteria logic using graphs), iText for creating PDF reports, StringTemplate, JDBC.

- designed and developed the authentication / authorization database and implemented all back-end Java code to integrate Apache Shiro into our JSF pages and deliver an elaborate RBAC authentication solution for all GAIA applications.

**Technologies:** Apache Shiro, PostgreSQL, JDBC.

- implemented a Jython solution integrating Java code with Python scripts. The objective was to allow the accounting people to write simple arithmetic expressions (formulas) to derive dynamically various fields that were used in the generation of financial reports.

**Technologies:** Jython, Python, Jasper Reports.

## Synelixis Solutions

ATHENS, GREECE

### Senior Software Engineer at the COAST project

Feb '10 – May '12

I led the company's technical participation in this project. The domain of the project was multimedia content delivery and streaming over a dynamically configured mesh of network caches that are co-located with network routers (something like a content delivery network). Some of the things I did:

- designed and implemented: (a) the cache communication protocol on top of TCP and (b) custom HTTP proxies in Java that transparently take advantage of the caches. Also, for demonstration purposes, coded a few pages for video streaming solutions.

**Technologies:** Java TCP networking, HTML, integration with video streaming / playback.

- designed and implemented a rich client overview and monitoring application that visualizes the utilization and available capacity of all network caches, plots graphs over time and allows an operator to dynamically interact with them by issuing commands or writing Python scripts (to automate common administrative logic) in a console-like prompt.

**Technologies:** Java (networking), Java Swing, Jython (for the dynamic console)

### Senior Software Engineer at the BeyWatch project

Jan '09 – Oct '10

I led the company's technical participation in this project. The domain of the project was home automation and centralized optimization and scheduling of household tasks involving use of electrical appliances in a system of continuously changing real-time tariffs. Some of the things I did:

- implemented a brute-force particle swarm optimization algorithm in Java that accepts as inputs a set of tasks, electricity tariffs over the next 24 hours and a weather forecast (so that solar panel output or heating needs may be anticipated) and calculates the best possible scheduling of tasks to minimize either cost or carbon footprint or a combination of both.

**Technologies:** Java

- implemented a rich client Java application that visualizes the scheduling of the various tasks against the electricity tariffs

**Technologies:** Java Swing

- implemented the client (scheduler) side of a number of controllers that are used to program or monitor household appliances (washing machines, refrigerators, solar panels)

**Technologies:** Java, REST, OSGI.

## Semantix

ATHENS, GREECE

### Technical Project Manager for the EGOS Visualization Tool

March '08 – Sep '08

I was technical project manager for the EGOS Visualization Tool for ESOC (Contract C21283). The project implemented a graphical front-end that integrates and provides additional functionality on top of the existing tools used by ESOC to check compliance with coding standards and conventions.

### Software Engineer in Roaming Studio products

2005 – 2007

I was responsible for the implementation of the critical conversions functionality in both the Roaming Studio and the Roaming Components products. These products are the company's flagship telecom products and revolve around the processing of TAP files which are used in GSM Roaming. The conversion logic is responsible for converting, e.g., a TAP file of version TAP3.11 into a file of version TAP3.10. The files are defined using different ASN.1 grammars both from a syntax and a semantics point of view so the transformation is a complex business logic procedure. Since there are more than 7 different TAP3 versions and conversion had to take place between any arbitrary pair there was a large number of conversion routines to be written. I defined a DSL used to describe the logic behind these

conversions (essentially transformation algorithms on deeply nested ASN.1 trees) and built a Python script that automatically generated C++ code implementing these transformations. In total I was able to reduce tens of thousands of lines of C++ code into as little as 700 conversion rules expressed in the above DSL (plus the Python script code generator).

**Technologies:** ASN.1, C++, Python

#### **Software Engineer at project ATLAS**

2002 – 2004

I was part of the engineering team that was tasked to implement the new Vodafone Greece billing system. Data (customer, subscriber, bills and calls information) migration to the new billing system and integration with over a dozen legacy peripheral systems which were scheduled to survive the migration to the new billing system. I was responsible for the integration code which was implemented in C++ and Java (for higher-level daemons) and which undertook to sustain the information flow between the new billing system and legacy systems which were not going to be replaced. Since no modifications were permitted in the legacy systems, the new billing system had to be wrapped in a façade allowing it to expose the same interface towards the legacy systems. I was also involved with the design of a massive “mediating” staging database of more than 400 tables and 40,000 lines of PL-SQL code (a large percentage of which I implemented myself). Finally I had small exposure with Portal Infranet programming (now Oracle Billing and Revenue Management).

**Technologies:** Java, Oracle, PL-SQL, C++, C

#### **Software Engineer at project DCH**

2001 – 2002

Design and implementation of the Vodafone Greece Data Clearing House system for roaming calls. I implemented code in C++ (for the decoding / encoding and validations / transformations of the TAP records), Java (for the orchestration logic) and PL/SQL (for server-side processing)

**Technologies:** C++, ASN.1, Java, Oracle, PL-SQL.

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## **Education**

National Technical University of Athens

ATHENS, GREECE

#### **Ph.D. from the Department of Electrical and Computer Engineering**

1998 – 2001

Thesis Title: ‘**Distributed Processing Technologies for Unified Provision of Telecommunications and Internet Services**’.

NTUA is the oldest and most prestigious technical university in Greece. I was awarded a Ph.D. for research into applying modern (at that time) software technologies in telecommunications networks. During that period of time I worked mostly with C++ and Java and developed code using distributed technologies like CORBA, RMI; Java applets, code interacting with telecom switch equipment, developed specialized video streaming applications in C++, etc. During that period of time I also published about a dozen papers (3 in international refereed journals including IEEE, the rest in conferences). Publications list provided at the end.

Technical University of Patras

PATRAS, GREECE

#### **Engineering Diploma from the Computer Engineering and Informatics Department**

1992 – 1997

CEID is the oldest university department in Greece focusing exclusively in computer and software engineering and awarding an engineering diploma after 5 years of studies. I entered 1<sup>st</sup> in rank after a nationwide competitive examination and finished 2<sup>nd</sup> in rank (class size ~150). Coded various applications in Pascal, Lisp, C and Java.

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## **Skills**

**Technical specialties:** Software design and implementation, alone or in a team. I am a professional Java / JavaScript coder but have also written production code in Python, Clojure and (in another life) C and C++. I am very comfortable at the command line and casually write Bash one-liners daily.

Solid knowledge of the following technologies: Java 7 (SE and EE), Ant/Ivy, HTML/CSS/JavaScript (ECMAScript 6 and 7), ReactJS, Spring Web MVC, XML, XPath, XSD, REST, SOAP, relational databases (PostgreSQL, Oracle, MySQL, Sybase). Administration skills: Linux administration, Bash scripting, Apache Tomcat, JBoss, PostgreSQL. Source control: Git, Subversion, ClearCase.

**Natural languages:** Greek (*mother tongue*), English (*full professional proficiency: Cambridge Certificate of Proficiency in English, Grade A*), Spanish (*A1 level–no degree*)

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## **References**

Available upon request.

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## **Publications**

### **International Standards**

- 2015** Markus Demleitner, Paul Harrison, Marco Molinaro, Gretchen Greene, Theresa Dower, Menelaos Perdikeas, "IVOA Registry Relational Schema" International Virtual Observatory Alliance. Latest version available at: <http://www.ivoa.net/documents/RegTAP/>. Arxiv link: <https://arxiv.org/abs/1510.02275>.

### **Books and reference works**

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- 1999** M. K. Perdikeas, O. I. Pyrovolakis, F. G. Chatzipapadopoulos and I. S. Venieris, "Service Design in Distributed Intelligent Networks" in "On the Way to the Information Society — A Retrospective View on 5 Years of ACTS IS&N Research" Baltzer press, 1999.

### **Papers in International, peer-reviewed Journals**

- 2019** J.-U. Ness et al. "Towards a better coordination of Multimessenger observations: VO and future developments" (<https://arxiv.org/abs/1903.10732>)—Proceedings article to 12<sup>th</sup> INTEGRAL conference and 1<sup>st</sup> AHEAD Gamma-ray Workshop. Journal of the Italian Astronomical Society, 2019, vol. 90, pg 110-117
- 2001** M.K. Perdikeas and I.S. Venieris, "Parlay-based Service Engineering in a Converged Internet-PSTN Environment" *Computer Networks (Elsevier)*, vol. 35, Issue 5, April 2001, pp. 565–578
- 2000** F. G. Chatzipapadopoulos, M. K. Perdikeas and I. S. Venieris, "Mobile Agent and CORBA Technologies in the Broadband Intelligent Network", *IEEE Communications Magazine.*, Vol. 38, Issue 6, pg. 116–124
- 1999** M.K. Perdikeas, F.G. Chatzipapadopoulos, I.S. Venieris and G. Marino, "Mobile Agent Standards and Available Platforms", *Computer Networks (Elsevier)*, vol. 31, Issue 19, August 1999, pp. 1999–2016

### **Papers in International Conferences, Workshops etc. (non-exclusive list)**

- 2014** Arviset C., Perdikeas M., Osuna P. and Gonzalez J., "The Euro-VO Registry, re-engineering the back-end" (<http://adsabs.harvard.edu/abs/2015ASPC..495..457A>)—presented in the 24<sup>th</sup> annual conference on Astronomical Data Analysis Software and Systems, Calgary, Canada, published in the ASP Conference Series, Vol. 495, Astronomical Society of the Pacific.
- 2011** Theodore Zahariadis, Menelaos Perdikeas, Fotis Chatzipapadopoulos, Javier Lucio Ruiz Andino, Maria Angeles Barba Rodriguez: Middleware for energy aware appliances—2<sup>nd</sup> Workshop on eeBuildings Data Models, Sofia Antipolis, France
- 2010** Menelaos Perdikeas, Theodore Zahariadis, and Pierre Plaza: The BeyWatch Conceptual Model for Demand-Side Management—E-Energy conference, October 14–15 2010, Athens, Greece
- 2001** I. S. Venieris; T. Magedanz; M. Perdikeas; L. Hagen: Enhancing Parlay with mobile code technologies—IEEE 2001 Intelligent Network Workshop, 6-9 May 2001, Boston MA, pp. 287–299
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- 1999** M.K.Perdikeas et al. An evaluation study of mobile agent technology: standardization, implementation and evolution—IEEE International Conference on Multimedia Computing and Systems, July 1999, Florence, pp. 287–291, vol.2 conferences.
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