Christiam E. Camacho

SUMMARY

An experienced professional in the field of bioinformatics with expertise as a cloud architect, technical lead, software engineer, project manager and SCRUM master with strong leadership qualities, outstanding analytical and problem-solving abilities as well as excellent communications skills in English and Spanish.

EXPERIENCE

NCBI/NLM/NIH Contractor, Medical Science & Computing, Inc   **July 2011-Present**
Cloud Architect, Technical Lead

- Mr. Architect and technical lead of the ElasticBLAST project, which aims to facilitate running BLAST on large query data sets (100,000+ bases/residue) against popular BLAST databases on the cloud. Technologies include kubernetes, GKE, GCS, python.
- Contributed to the development and management of a project to move the NCBI WebBLAST public web service to the cloud, using technologies such as Apache Hadoop and Spark, S3/GCS, PubSub, Dataproc, GKE, Protocol Buffers and kubernetes.
- Author and maintainer of the NCBI BLAST+, eDirect, MagicBLAST, and SRA toolkit docker images. Coached others at NCBI in moving to Docker
- Project manager and key developer of the BLAST AWS Overflow system, which uses AWS EC2 instances to run the NCBI WebBLAST workload on the cloud during peak hours.
- Architected, led the implementation, performance profiling, testing, and deployment of the BLAST machine image hosted at the AWS Marketplace. This product was released to the public in 2014 and relied on technologies such as AWS EC2, BLAST+ applications, the NCBI SRA toolkit, and Perl.
- Architect and primary developer of the system that distributes BLAST databases to AWS and GCP clouds.

NCBI/NLM/NIH Contractor, Medical Science & Computing, Inc   **July 2009-Present**
BLAST Strategy Team Member
- Contributes to strategic direction, product management, and roadmap planning for the BLAST suite of products at NCBI.
- Proposed social media communications plan for BLAST project for 2019 and established it as a successful model to engage end-users.

NCBI/NLM/NIH Contractor, Medical Science & Computing, Inc   **May 2015-Present**
Open Source Code Contributor
- Contributed source code to open source projects such as BioConda, HomeBrew, BioPython, BioPerl, and BioJava.
- Participated as team co-lead in the NCBI codeathon to build a federated viral index.
- Contributed computational tools to NCBI codeathon for the Viral Discovery Project.

NCBI/NLM/NIH Contractor, Medical Science & Computing, Inc   **July 2009-Present**
Project Manager, SCRUM Master
- Performs project management roles using tailored PMI and Agile/SCRUM approaches for various BLAST related projects: BLAST on the Cloud, SmartBLAST, kmer BLASTP, BLASTDBv5, the BLAST+ command line applications, and the WebBLAST project.
- Managed the BLAST Database Pipeline redesign project from inception to its successful deployment in 2012 while pioneering Agile software development practices with the BLAST team.

NCBI/NLM/NIH Contractor, Medical Science & Computing, Inc   **July 2001-Present**
Senior Software Engineer
- Led the development of the new suite of BLAST command line applications - one of the most widely used tools for sequence alignment in the world (publication), as well as the SOAP/WSDL based BLAST Web

Service and its demo clients, the latter of which were implemented in C++, C#, Java, and Perl. Both of these efforts were made available to the public in the fall of 2008 and were presented at the 2008 NIH Research Festival.

- Introduced software engineering practices to his team such as design and code reviews, unit testing, regression testing, refactoring, and implemented automated build, test, documentation, and software metrics systems which help enhance the quality of the software produced. More notably, he helped his team adopt unit testing and as a result the team became a pioneer and desirable model for testing practices at NCBI. He has also shared this knowledge by means of a department-wide seminars.
- Responsible for the management and coordination of releases of the various libraries produced by the BLAST team in the NCBI C++ toolkit, as well as the public releases of the BLAST+ suite of command line applications. Member of the NCBI C++ Steering committee. He designed, implemented, tested, documented and maintains the tools and procedures to manage the day-to-day software development activities in the BLAST team, providing it with independence for software development efforts and experimentation, while increasing the stability of the BLAST software in the NCBI C++ toolkit, which many NCBI applications depend on. In 2015 he automated the build process for the BLAST+ command line applications by using TeamCity.
- Participated as part of the team that ported the BLAST code to from the NCBI C to C++ toolkit, in particular the PSSM creation engine, the BLAST command line applications, and their test suites. He also coordinated and contributed to the development of new features such as masking for subject sequences, search strategies, BLAST tasks, application installers, and authored the BLAST+ command line applications' user manual and its cross-platform regression test suite.
- Technical lead and primary developer of the BLAST database update system. This system manages the public and in-house distribution of BLAST databases containing terabytes of biological sequence data which doubles in size every 1.5-2 years.
- 18 years of C/C++ programming experience, including libraries and frameworks such as the NCBI C/C++ toolkits, STL, Boost, OpenMP, MSSQL server, SQLite, LMDB, pthreads and other UNIX application program interfaces (APIs).
- Participated in teams composed to evaluate software tools, provide guidelines for best practices, perform security audits of NCBI software, as well as acted as a liaison between the NCBI structure and BLAST teams.

Commerce One   **May 2000-May 2001**
Software Developer Intern
- Helped develop a GUI fingerprint workstation used by many police departments worldwide (AFIS).
- Acquired advanced knowledge of Microsoft's Visual C++, MFC, Component Object Model (COM), and ActiveX component technology. He also acquired debugging skills in Visual C++ and Visual Basic (VB).

EDUCATION

- M.S., Computer Science, Johns Hopkins Whiting School of Engineering, 2005
- B.S., Computer Science, University of Maryland, Baltimore County, 2001

TECHNICAL SKILLS

- Operating Systems: Linux, MacOSX, Solaris Sparc/Intel, Windows 7
- Applications and Software: Apache Spark, Apache Hadoop, Git, Subversion (SVN), Concurrent Version System (CVS), Maven, Ant, gprof, valgrind, VTune, MPI, MS Office suite, MS Visual C++, Pthreads, UNIX APIs, X Windows, TeamCity CI, Jupyter Notebooks, Conda/BioConda
- Programming and Scripting: Boost C++ libraries, C, C++, Python, Perl, Java, HTML, SOAP, UNIX shell scripting, SQL, C++ STL, UML, Visual C++, WSDL, XML, ASN.1, Protocol Buffers
- Databases: Microsoft SQL server, MySQL, SQLite, LMDB, BerkleeDB

HONORS & AWARDS

- 2019 National Library of Medicine Group Award in recognition of cloud-based alignment workflows for the Basic Local Alignment Search Tool.
- 2018 National Library of Medicine Group Award in recognition of BLASTDBv5 accession-based system.
- 2017 National Library of Medicine Personal Award for innovation using cloud instances to handle BLAST website traffic.

- 2014 National Library of Medicine Group Award in recognition of moving BLAST to the AWS cloud.
- 2014 National Library of Medicine Personal Award in recognition and appreciation of exceptional service.
- 2001 NCBI Employee Recognition Award for taking new BLAST database code and testing, debugging.

PUBLICATIONS & PRESENTATIONS

- Camacho CE, Lesko M., Cope C., Madden T.L. BLAST on the Cloud. NIH Research Festival 2014, Poster Session
- Boratyn G., Camacho C., Federhen S., Merezhuk Y., Madden T.L., Schoch C., Zaretskaya I. MOLE-BLAST a new tool to search and classify multiple sequences. NIH Research Festival 2014, Poster Session
- Boratyn GM, Camacho C, Cooper PS, Coulouris G, Fong A, Ma N, Madden TL, Matten WT, McGinnis SD, Merezhuk Y, Raytselis Y, Sayers EW, Tao T, Ye J, Zaretskaya I. *BLAST: a more efficient report with usability improvements*. Nucleic Acids Res. 2013 Jul; 41(Web Server issue):W29-33. doi: 10.1093/nar/gkt282. PubMed PMID: 23609542.
- Camacho C, Coulouris G, Avagyan V, Ma N, Papadopoulos J, Bealer K, Madden TL. *BLAST+: architecture and applications*. BMC Bioinformatics. 2009 Dec 15;10:421. doi: 10.1186/1471-2105-10-421. PubMed PMID: 20003500; PubMed Central PMCID: PMC2803857.
- Camacho C., Ma N., Tao T., Agarwala R., Morgulis A., Madden T.L. (2008-): BLAST Command Line Applications User Manual. NCBI Bookshelf http://www.ncbi.nlm.nih.gov/books/NBK279690
- Camacho C., Avagyan V., Coulouris C., Madden T.L. SOAP and BLAST: New network BLAST services at the NCBI. NIH Research Festival 2008, Poster Session
- Camacho C., Madden T.L, Avagyan V., Coulouris G. A new generation of BLAST command-line applications, NIH Research Festival 2008, Poster Session.

CERTIFICATES & PROFESSIONAL DEVELOPMENT

- [Introduction to Genome Technologies](), 04/2020
- Architecting with Google Kubernetes Engine, 03/2020
- Certified SCRUM Master, 2019
- [Data Engineering on Google Cloud Platform](), 05/20/2018
- Member, Association of Computing Machinery, 2001-Present