

# Programação Paralela Avançada

Computação Voluntária

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Professor: Mauricio Aronne Pillon

07/11/2019

# Agradecimentos

O presente trabalho foi realizado com apoio da  
Coordenação de Aperfeiçoamento de Pessoal de  
Nível Superior – Brasil (CAPES) – Código de  
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- Programação Paralela Avançada

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# Introdução



## Great Internet Mersenne Prime Search

### *GIMPS*

Finding World Record Primes Since 1996

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## GIMPS History

Since its founding in 1996, GIMPS has discovered [17 Mersenne primes](#) so far. Could you be next?

**For a full history of GIMPS, please see the Wikipedia entry**  
[Great Internet Mersenne Prime Search](#)

GIMPS was founded in 1996 by George Woltman. The software ran on Intel i386 systems using hand-tuned assembly code for the critical calculations, resulting in highly optimized [Lucas-Lehmer](#) code.

It wasn't long before GIMPS had it's first discovery in November of that same year, showing the effectiveness of distributed computing in harnessing spare computer cycles in a coordinated effort.

As efficient as the software itself was, the early years of GIMPS involved a manual process using emails to request work assignments and then send the results back. As the project grew, a more efficient system was needed and Scott Kurowski responded to that need with the introduction of PrimeNet through his company Entropia, a pioneer in the early days of distributed computing projects. Without Scott's invaluable contribution, the ability to manage thousands of volunteers and millions of work assignments would not have been possible. PrimeNet paved the way for the future growth of the project as a whole.

With the solid foundation of PrimeNet in place, George continued his focus on improving the core calculations of Prime95. As new Intel and AMD processors were introduced, George worked with the new instruction sets and timings to increase the performance. The core of the program is now able to optimize itself to work at peak efficiency on all modern CPU's, but also still finds a home on many older generation systems.

To see a list of all the large and small milestones in the GIMPS project, please see this page: [GIMPS Milestones](#)

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PrimeNet volunteers

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As efficient as it was, the work was slow. As the project grew, a pioneer in distributed computing, PrimeNet, was born. PrimeNet brought volunteers back. As the project grew, a pioneer in distributed computing, PrimeNet, was born. PrimeNet brought volunteers back. As the project grew, a pioneer in distributed computing, PrimeNet, was born. PrimeNet brought volunteers back.

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# Introdução

Programação Paralela = Computação Voluntária

# Introdução

Programação Paralela = Computação Voluntária  
+  
Voluntários



# Introdução

Programação Paralela = Computação Voluntária  
+  
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$$A = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & \vdots & \vdots \\ a_{m1} & a_{m2} & \cdots & a_{mn} \end{bmatrix}$$

# Introdução



# SETI@home

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## O que é SETI@home?

SETI@home is a scientific experiment, based at [UC Berkeley](#), that uses Internet-connected computers in the Search for Extraterrestrial Intelligence (SETI). You can participate by running a free program that downloads and analyzes radio telescope data.

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## Notícias

### New Nebula progress report

Check out [All in the Timing](#), a report on recent progress in SETI@home's back-end data analysis.

4 Nov 2019, 21:55:27 UTC • [Discutir](#)

### SETI@home news for Alexa

SETI@home member Morris Penasso has developed a SETI@home News "skill" for Amazon Alexa/Echo that can tell you the latest from our news feed.

# Plataforma



## Compute for Science

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BOINC lets you help cutting-edge science research using your computer (Windows, Mac, Linux) or Android device. BOINC downloads scientific computing jobs to your computer and runs them invisibly in the background. It's easy and safe.

About 30 science projects use BOINC; examples include [Einstein@Home](#), [IBM World Community Grid](#), and [SETI@home](#). These projects investigate diseases, study global warming, discover pulsars, and do many other types of scientific research.

You can participate in either of two ways:

### Choose science areas

To contribute to science areas (biomedicine, physics, astronomy, and so on) use [Science United](#). Your computer will do work for current and future projects in those areas.

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BOINC lets you help cutting-edge science projects on your computer and runs them for you.

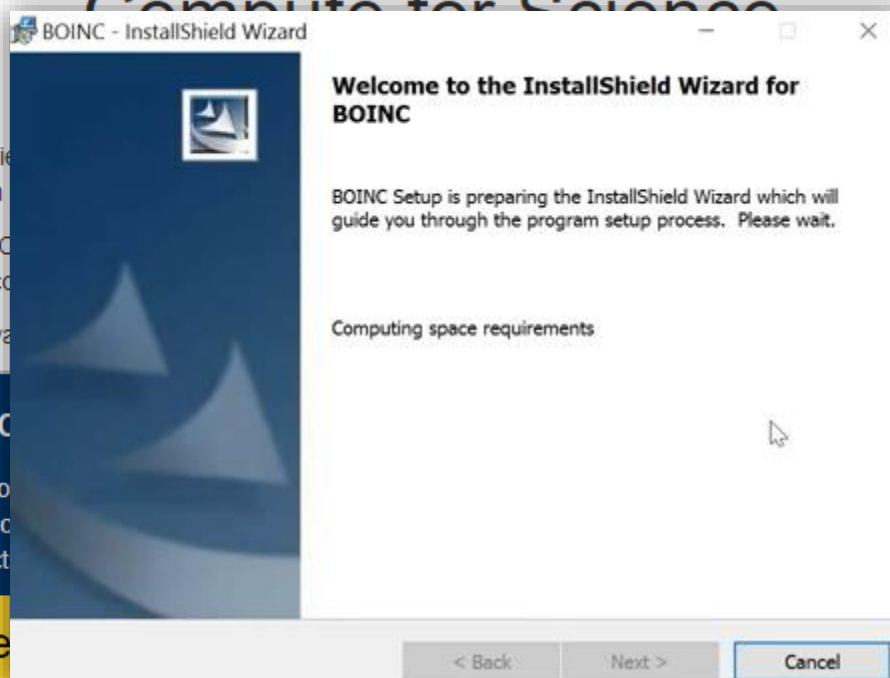
About 30 science projects use BOINC to study diseases, study global warming, discover new drugs, and more.

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## Computing

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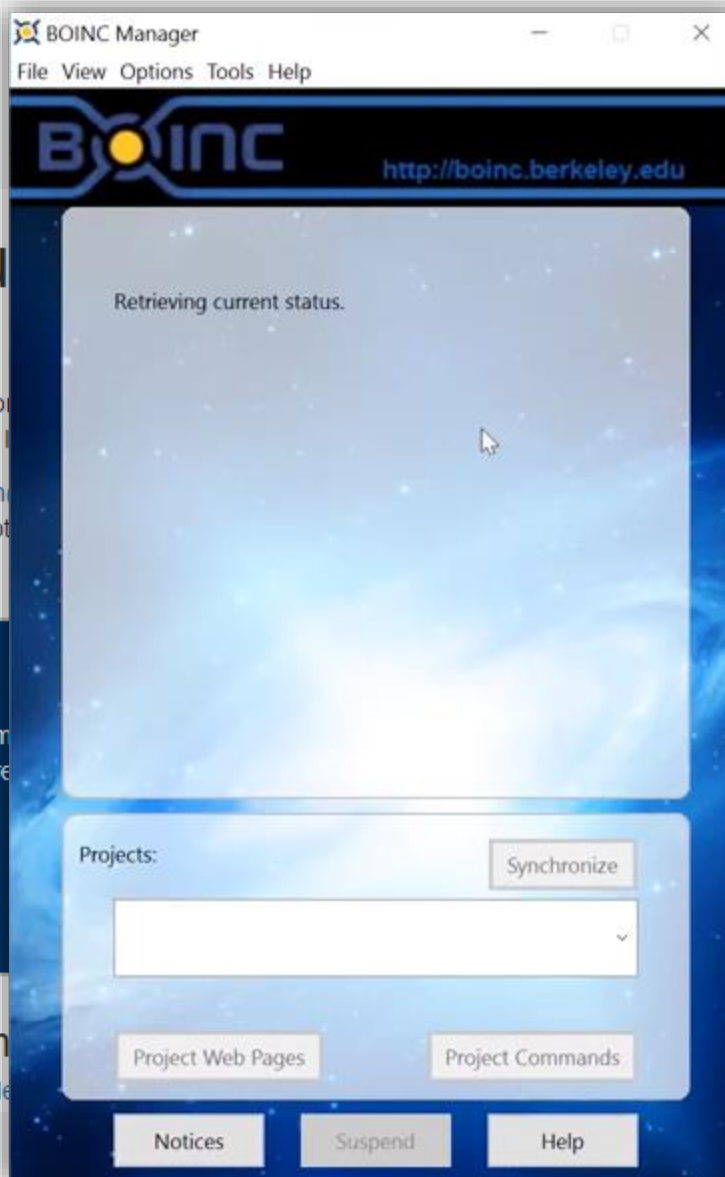
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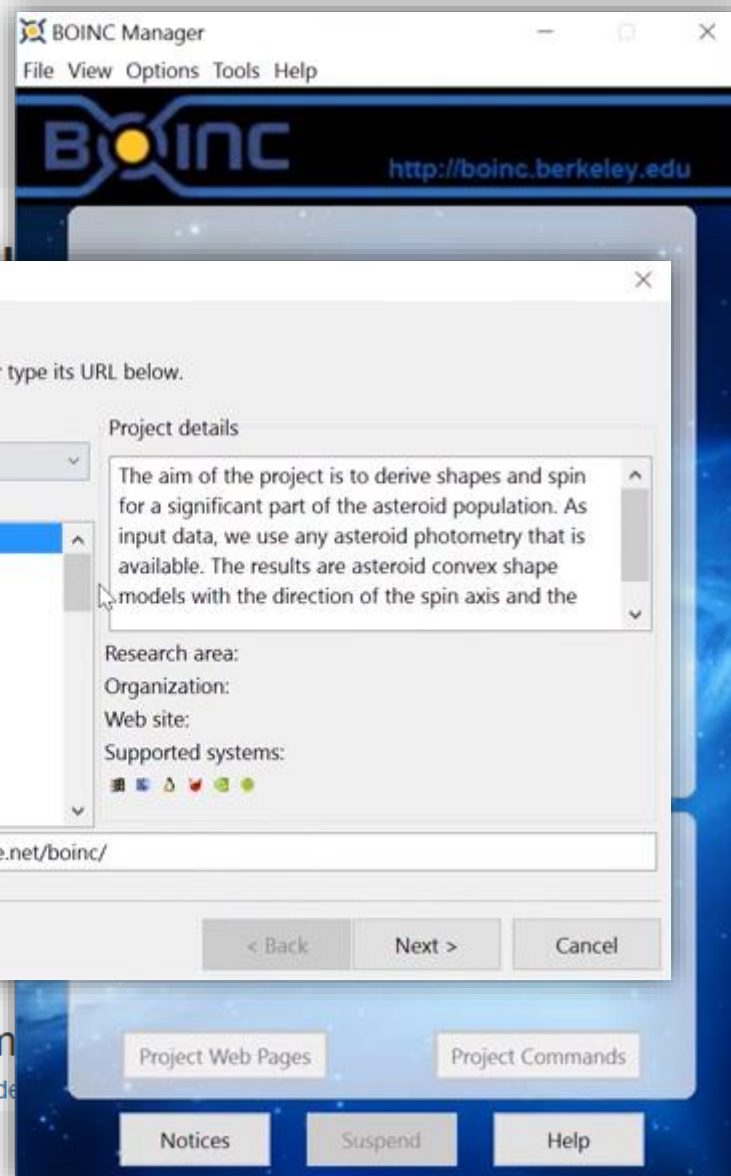
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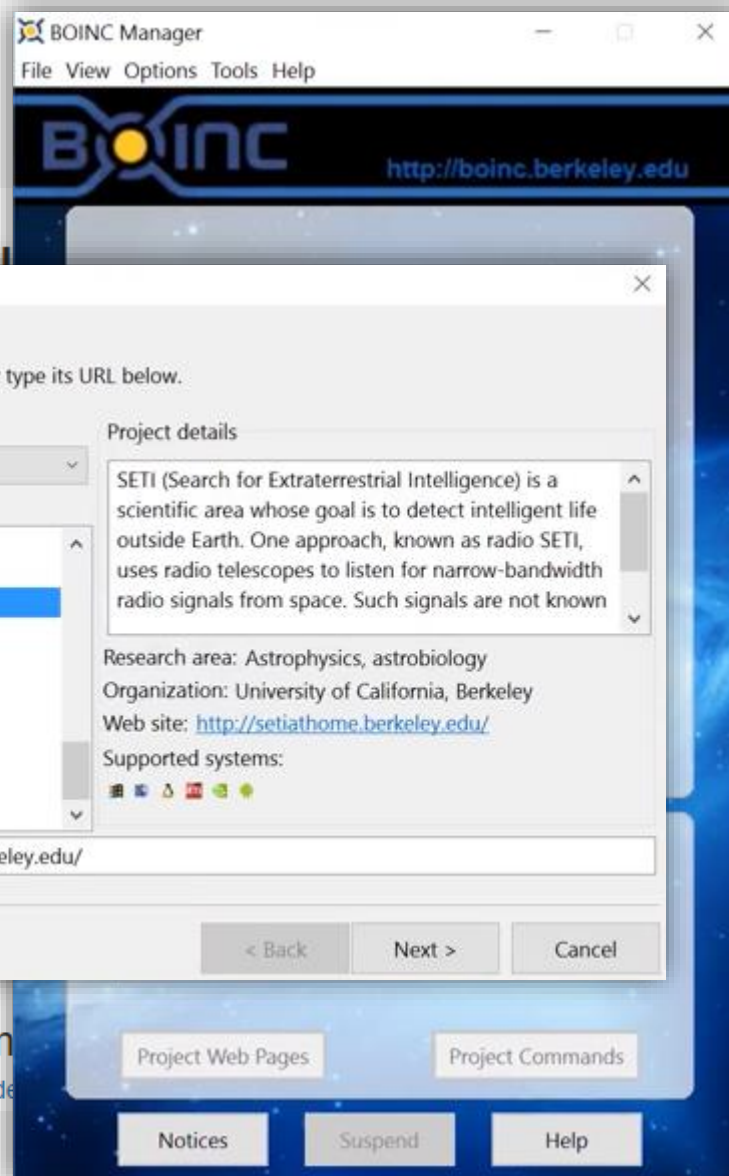
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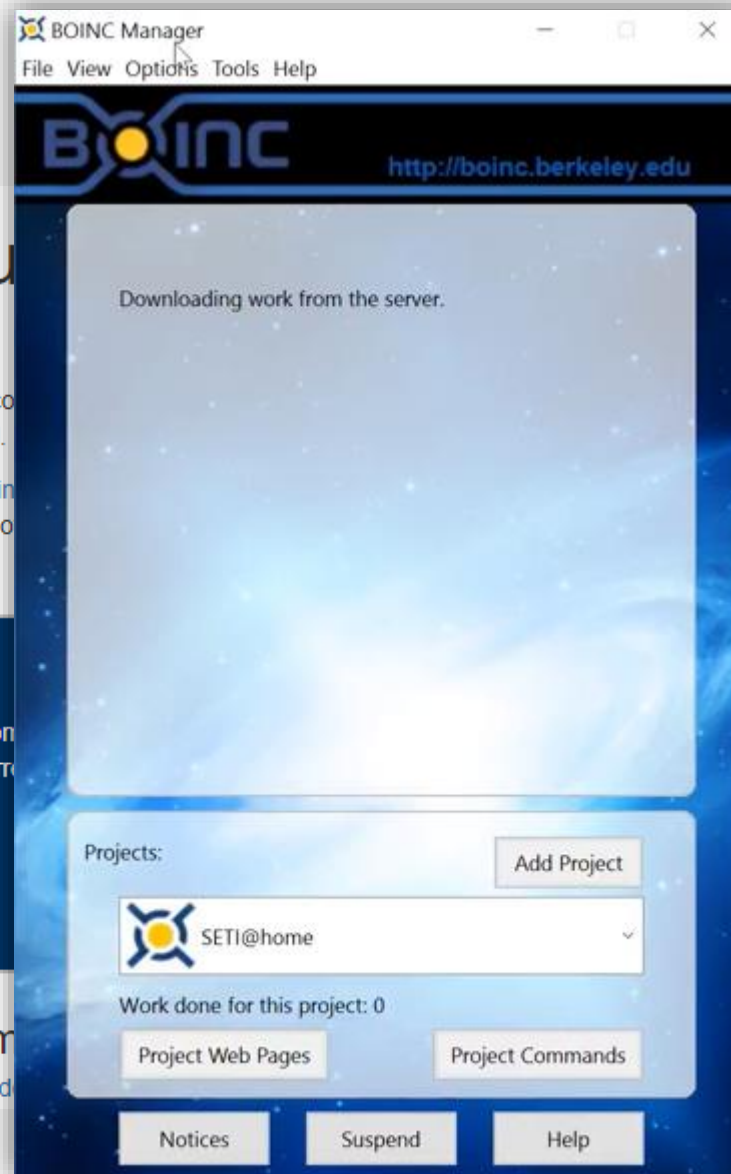
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## You can help researchers smash childhood cancer

Most cancer research focuses on cancers that primarily affect adults. That's why World Community Grid volunteers are helping an international research team find new treatments for some of the most common childhood cancers. [Learn More](#)



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AIDS is constantly evolving.  
So are the tools to fight it.

Tasks Returned Today: 116.207

Since 2005, the volunteers behind FightAIDS@Home have helped scientists advance HIV research. The next phase of that effort is just beginning, and you can play a key role in helping the millions of people afflicted by this deadly virus. [Learn More](#)

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## Technical documentation

These documents describe how to create and operate a BOINC project. Don't be scared by the amount of information; most of it is for advanced features that you probably won't need.

### Quick start

- [Create a BOINC project in 1 hour or less](#)

### BOINC concepts and features

- Computing model
  - [Basic concepts](#)
  - [Platforms](#)

#### Technical documentation

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[Creating a BOINC project](#)

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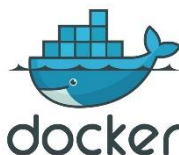
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## The BOINC application programming interface (API)

The BOINC API is a set of C++ functions. Most of the functions have a C interface, so that they can be used from programs written in C and other languages. Unless otherwise specified, the functions return an integer error code; zero indicates success. To use the API include the header file:

```
#include "boinc_api.h"
```

BOINC applications may have an associate graphics program, which can act as a screensaver. The API for these graphics apps is [here](#).

### Initialization

Initialization must be done before calling other BOINC functions. For

### The BOINC application programming interface (API)

#### [Initialization](#)

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#### [Termination](#)

#### [Resolving file names](#)

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## Multicore apps

Depending on your application and project, it may be desirable to develop a multi-thread application. Possible reasons to do this:

- Your application's memory footprint is large enough that, on some PCs, there's not enough RAM to run a separate copy of the app on each CPU.
- You want to reduce the turnaround time of your jobs (either because of human factors, or to reduce server occupancy).

You may be able to use OpenCL, MPI, OpenMP, [CUDA](#), languages like Titanium or Cilk, or libraries of multi-threaded numerical "kernels", to develop a multi-threaded app.

## Initialization

You will need to use [the appropriate initialization function](#).



# Conclusão

O BOINC é uma excelente plataforma distribuída de computação voluntária, apresentando desempenho superior a supercomputadores em relação ao paralelismo de dados.

O BOINC é de arquitetura centralizada cliente/servidor. Com toda a comunicação sendo iniciada pelo cliente.

O BOINC é um sistema de middleware para computação voluntária e distribuída especialmente voltado para aplicações do tipo mestre-escravo.

O BOINC é considerado um complemento dos sistemas Grid que suportam a partilha de recursos.

Não gostou? Alternativas:

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