# Educational Innovation & Technology at MIT

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MIT, Office of Educational Innovation and Technology

MIT OEIT Office of Educational Innovation and Technology

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# Outline

- About..
  - OEIT at MIT
  - About You
- Projects and Resources
  - OpenCourseWare
  - Visualizing Cultures
  - STAR

# About Us: OEIT at MIT

- MIT Office of Educational Innovation and Technology
  - Works with faculty with **innovative** ideas
  - **Scales up projects** from individual faculty to classes/departments/university
  - **Partners** with other campus entities to "run" innovations long-term

# Office of Educational Innovation and Technology

## Mission

1. Work with faculty, students, and staff in developing innovative uses of technology for teaching and learning, and its integration in the curriculum.

2. Support faculty efforts to demonstrate global leadership in educational innovation through the use of technology.

3. Collaborate with educational technology service providers at MIT and elsewhere to ensure that innovative technology applications for education are supported as sustainable services.

# Office of Educational Innovation and Technology

## Strategic Focus

### Bridging Research and Learning

Innovative tools to bring the practice of research to the process of learning.

### Linking Content to the Curriculum

Activities that address how digital content is integrated into teaching and learning.

### Fostering Communities of Innovation and Practice

Communities centered around specific technology solutions, such as visualization, active learning, emerging pedagogies, etc.

# About Us: Jeff and Brandon

- Both: Work has been higher education focused
- **Jeff**
  - Residential computing (dorms)
  - Stellar at MIT (similar to Moodle)
  - O.K.I. (technical interoperability)
- **Brandon**
  - Educational digital libraries (collections of learning resources)
  - STEM (science, technology, engineering and mathematics)
  - Open Content & OpenCourseWare (outside of MIT)

# About You!

- Grade-level?
- Specific discipline focus?
- Published a course/materials in Moodle?

# Why are we here?

- To learn from you!
- To show you a little bit about what we're doing that might be useful.

- To learn from you!

# Setting the Stage

- Future partnerships?
  - We want to **understand** your **needs**
  - Explore **opportunities** for collaboration
  - MIT Faculty that we work with are interested in **collaborating** with **K-12** teachers and students

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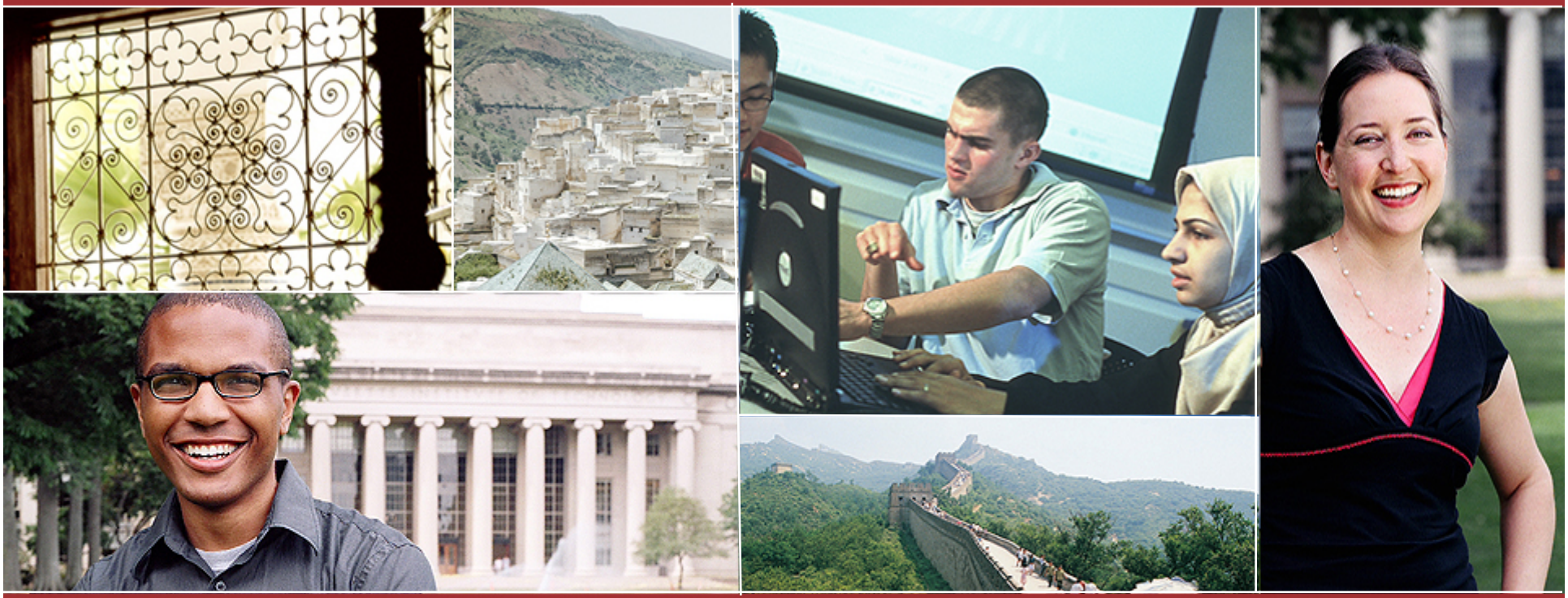


# MIT OpenCourseWare & Highlights for High School

MITOPENCOURSEWARE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Thanks to Steve Carson, Dan Carchidi, & Rana Bannerjee, MIT OpenCourseWare

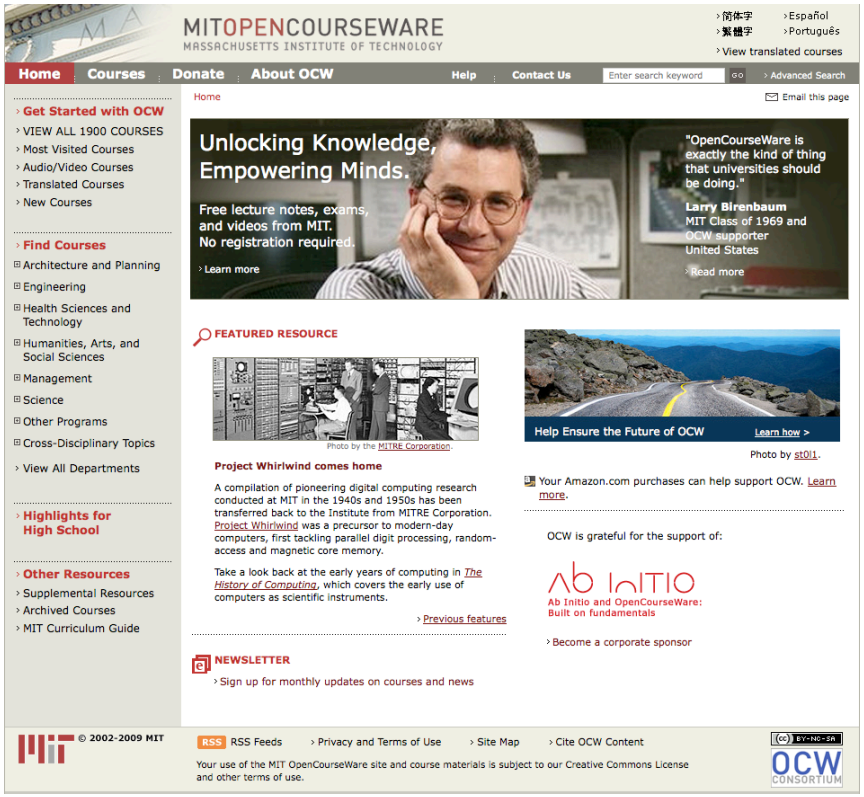
# MIT OpenCourseWare

## Overview

- OpenCourseWare started in 2002
- "**Publication**" of MIT providing access to course materials
- Key Aspects
  - Does not grant degrees
  - Does not provide access to faculty
  - Course materials
  - **Licensed "openly"** (aka "open content"), using a Creative Commons Attribution-NonCommercial-ShareAlike license

# OpenCourseWare Demonstration

- **1,900** Courses published
- Access to **video/audio lectures**
- Some courses translated in **Spanish**, Traditional & Simplified **Chinese**, Portuguese, Thai, Persian




http://ocw.mit.edu/



MITOPENCOURSEWARE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

OPEN COURSEWARE CONSORTIUM

Universities working together to advance education and empower people

- **OCW is more than MIT**
- **Collaboration of 200 universities and organizations**
- **Shared vision, commitment to act**
- **9,000 courses published**

http://ocwconsortium.org/

# Extra Tools for OCW

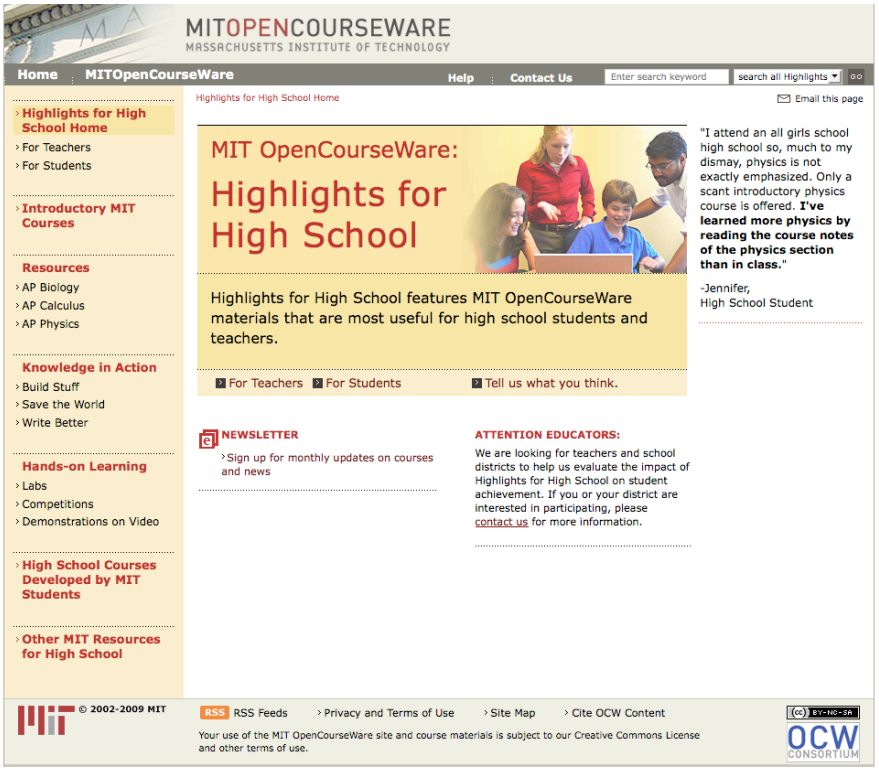
- OCW Finder :: ocwfinder.org
  - Search and browse across OCWs
  - OCW Consortium also has a search at www.ocwconsortium.org/use/use-dynamic.html

- OER Recommender :: oerrecommender.org
  - "Related" resources from selected collections
  - Plug-in for Firefox

# Highlights for High School

## First Steps…

- Highlights for High School is MIT's first step in realizing the OCW Secondary Education vision. Its goals are:
  - To **simplify access** to OCW materials relevant for **high school students and teachers**
  - To **publish high school courses developed at MIT** for students and teachers




http://ocw.mit.edu/highschool

# Highlights for High School

## Guiding Assumptions

- Supplement, not replace current course materials
- May influence lecture vs. facilitation in the classroom
- Teacher professional development
- Inexperienced and experienced teachers will use differently
- Teachers don't have time to browse extensively, need to find relevant material immediately



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# Highlights for High School

## Design Principles

- First, focus on upper grades of high school (**11th and 12th grade**), closest to undergraduate level

- Use **existing materials** on OCW, but only those appropriate for a high school audience

- Use **high school students** and MIT freshman to decide what is appropriate and useful

- Publish MIT outreach program materials and student developed courses – advanced science and math topics, taught in a fun, more informal manner



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# Highlights for High School

## Site Contents

- Thousands of lecture notes, problem sets, exams and other resources from introductory MIT courses

- Multimedia content including captioned **video** clips, **audio** clips, and java **applets**

- AP® Sections
  - Over 500 **Calculus** resources
  - Over 600 **Biology** resources
  - Over 1,650 **Physics** resources

- **Sampling** of original and inspiring MIT **student-developed courses**

# Highlights for High School

## Demo


http://ocw.mit.edu/highschool

# Highlights for High School

## User Feedback

"I am an MIT alumna (class of 2001) and this is my first year teaching AP Biology. Thank you for so many wonderful resources for AP Bio! I am so proud of being MIT Alumni and for being able to count on MIT to help me in my work!" *MIT alumna*

"I just wanted to say thank you for the fantastic work you do. I can't help but think this is one of the greatest contributions to democratic education I know of." *Educator*



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# Highlights for High School

## Web Analytics

- Over 600,000 visits since launch on November 29, 2007
- ~1,300 visits per day
- ~65% of users are from the United States, ~35% international
- ~34% HS teachers, ~16% HS students
- Users from 190 different countries have visited the site



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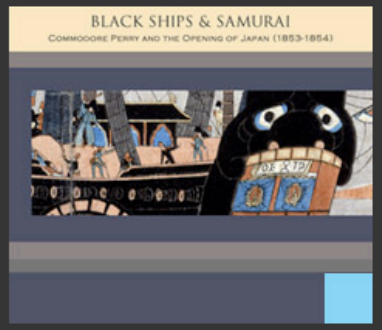
# MIT Visualizing Cultures

MIT VISUALIZING CULTURES Units | Intro | Events | Press | Bio | Contact

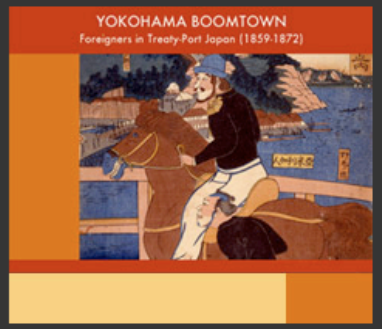
## Visualizing Japan




**Black Ships & Samurai**
Commodore Perry and the Opening of Japan (1853–1854)

On July 8, 1853, residents of feudal Japan beheld an astonishing sight; foreign warships entering their harbor under a cloud of black smoke. Commodore Matthew Perry had arrived to force the long-secluded country to open its doors. Essay by John W. Dower

[VC|TV] [VC|Curriculum]




**Yokohama Boomtown**
Foreigners in Treaty-Port Japan (1859–1872)

This window on the imagined life of foreigners in Japan at the dawn of the modern era is based on the catalogue of the 1990 exhibition at the Arthur M. Sackler Gallery, Smithsonian Institution, *Yokohama: Prints from Nineteenth-Century Japan*, by Ann Yonemura. Essay by John W. Dower.

[VC|TV] [VC|Curriculum]

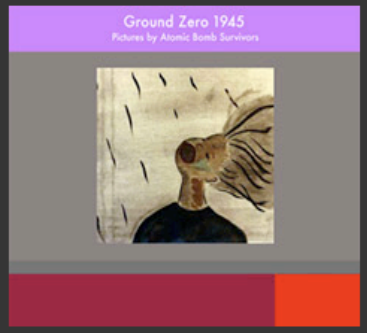

**Felice Beato's Japan: Places**
An Album by the Pioneer Foreign Photographer in Yokohama

This 50-image album features scenes along the routes that foreign sightseers travelled in the opening years of the Meiji period. Album courtesy of the Hood Museum of Art, Dartmouth College. Essay by Allen Hockley


**Yellow Promise/Yellow Peril**
Foreign Postcards of the Russo-Japanese War (1904–05)

The first war to be depicted internationally in postcards is captured here in these dramatic images. Produced in association with the Museum of Fine Arts, Boston. Essay by John W. Dower.

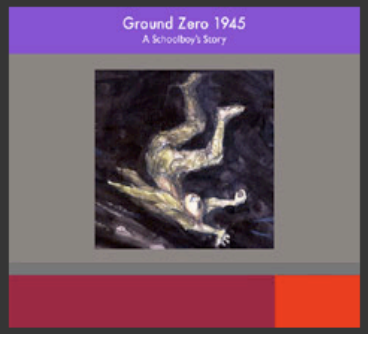
[VC|TV] [VC|Curriculum]




**Ground Zero 1945**
Pictures by Atomic Bomb Survivors

These drawings and paintings by Japanese survivors of the atomic bomb were created more than a quarter century after the bombs fell on Hiroshima and Nagasaki in August 1945. They are provided by the Hiroshima Peace Memorial Museum. Essay by John W. Dower.

[VC|TV]




**Ground Zero 1945**
A Schoolboy's Story

This unit presents the illustrated testimony of Akihiro Takahashi, who survived the atomic bombing of Hiroshima on August 6, 1945. Illustrations by Goro Shikoku, with English translation by Yuki Tanaka. Courtesy of Hiroshima Peace Institute.

[VC|TV]

# MIT Visualizing Cultures

## www.visualizingcultures.com

Office of Educational Innovation and Technology

# STAR: Software Tools for Academics & Researchers

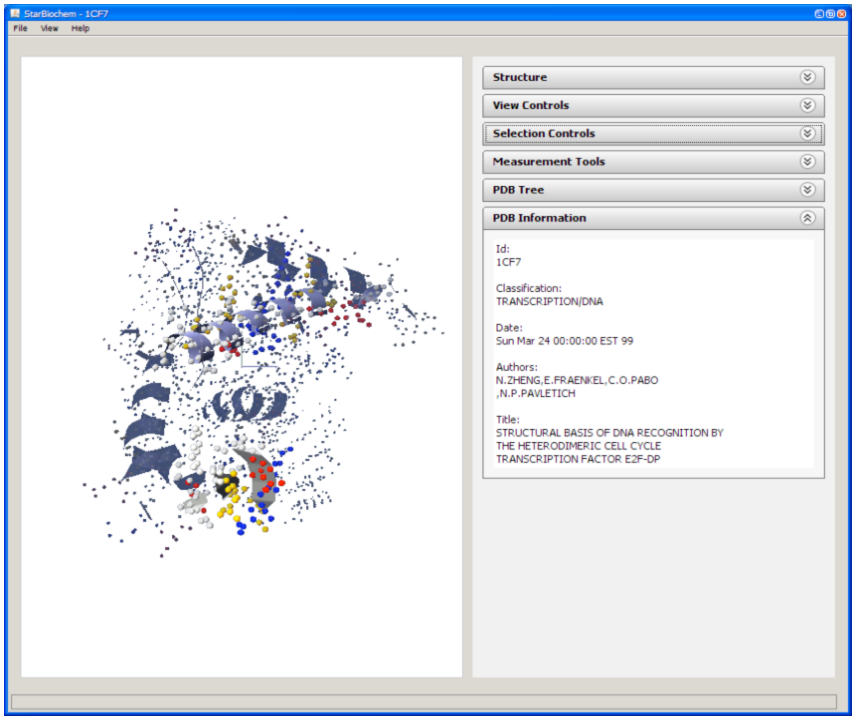
http://web.mit.edu/star

- The STAR program seeks to **bridge the divide between** scientific **research** and the **classroom**.
- Created **custom interfaces** to research software to **focus** on use for **learning**/ teaching

Thanks to Ivica Ceraj, Justin Riley, Lourdes Aleman, Sara Bonner, Rocklyn Clark, Chuck Schubert

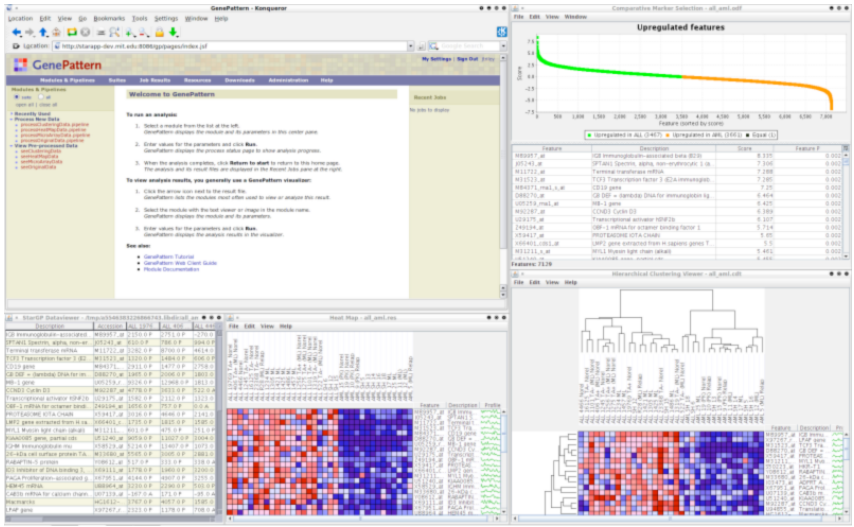
# Star:Biochem

- **3D protein viewer** that allows students to learn key concepts in structural biology in an interactive manner.
- This software allows for the visualization and manipulation of many of the PBD (Protein Data Bank) molecules in a 3D environment.



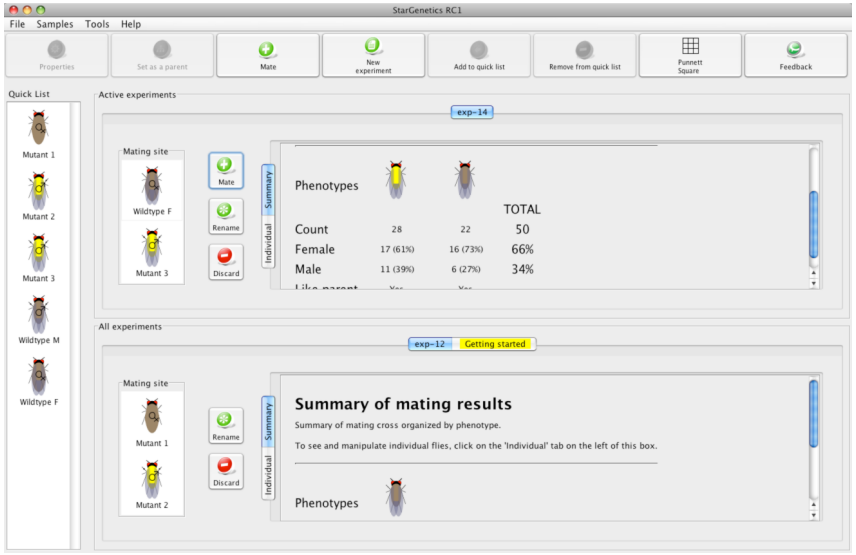
# Star:Biogene

- A set of visual and analytic software tools for the **analysis of genomic gene expression** data generated **through microarray analysis**.
- This software allows students to compare the **expression of multiple genes** across a range of biological samples (cell lines, tumors, etc).



# Star:Genetics

- A set of **tools for analyzing genetic traits**.
- This software simulates **mating experiments** between organisms that are genetically different across a range of traits and provides data that students can use to analyze the nature of the genetic traits in question.

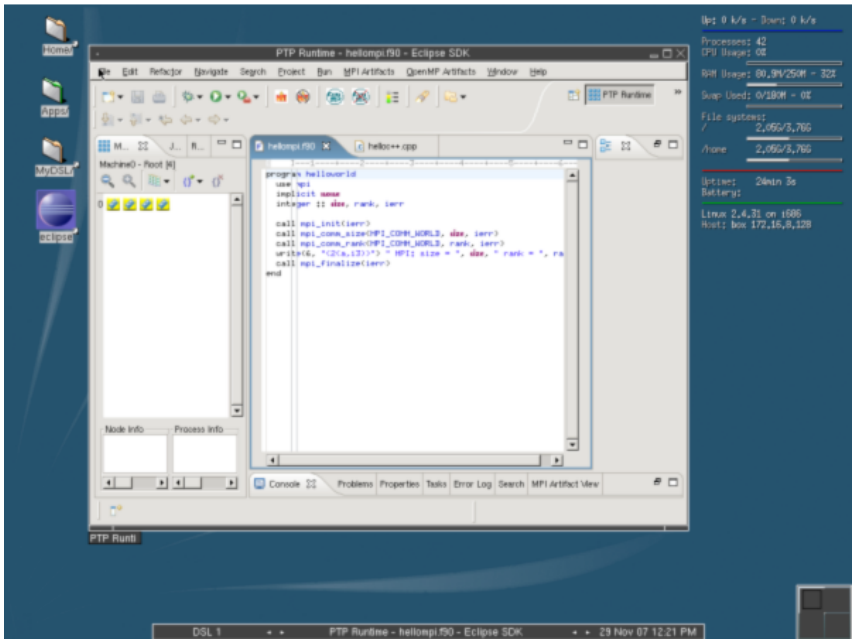


# Star:ORF

- Facilitates the identification of the protein(s) encoded within a DNA sequence. ORF stands for **O**pen **R**eading **F**rame and is defined as a stretch of DNA sequence that likely encodes for a protein.
- Using StarORF, the DNA sequence is first transcribed into RNA and then translated into all the potential protein chains encoded within each of the six translation frames (3 in the forward direction and 3 in the reverse direction).
- This allows students to **identify the translation frame** that results in the **longest protein coding sequence**.

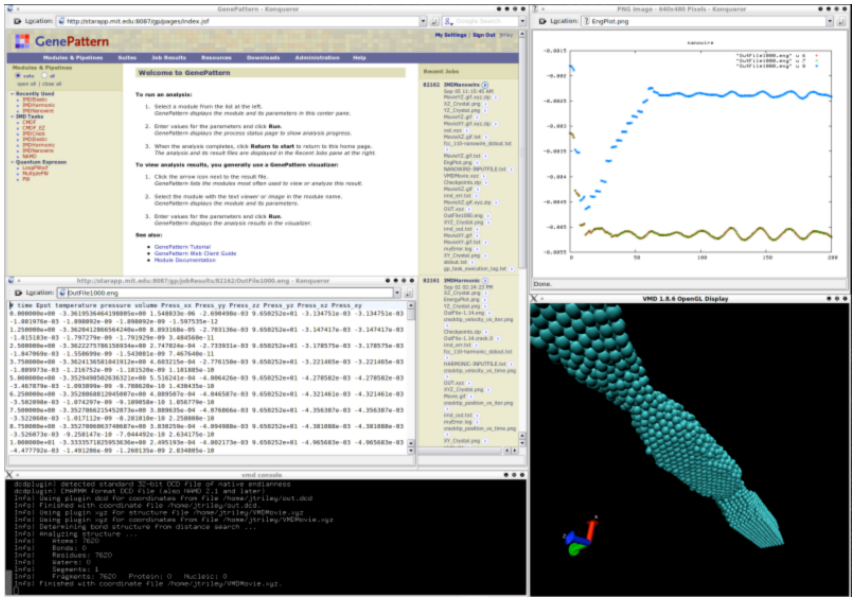
# Star:HPC

- Provides an on demand computational cluster for **teaching parallel programming** using both OpenMP and OpenMPI technologies.



# Star:MolSim

- A collection of **molecular dynamics and atomistic materials modeling** research software available via the web.



# Thanks!

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