The Next Generation of Scientists in the Workforce

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Purdue SECANT Workshop

November 16, 2007

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Questions that need answered

- What do scientists need to know about Computer Science?

- What skill set is expected?

- What computational thinking abilities are required?

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What do I do?

- Software technical lead for Flow Cytometry tools
- We study & learn the vocabulary of "flow"
- We study & learn how to control the instrument
- We study & learn to build the instrument
- We put on lab coats and act like flow scientists
- We go into the field and observe their processes

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So you're thinking "What is Flow Cytometry"?

- It's a technique for counting and examining characteristics of cells that are suspended in a stream of fluid.

- Used by researchers and clinicians.

- It's a popular tool used to study blood cancer.

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How does flow cytometry work?

- The cells flow down a thin glass tube ..

- The cut across a laser beam ..

- They fluoresce ..

- We capture the fluorescent energy and convert it into a digital value that measures a characteristic of the cell.

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What do we supply the scientists with?

- Data Management

  Acquisition, Organization, Querying, Visualization

  8 years of clinical data is 3 tb
  8 years of pharmaceutical data is 185 gb
  8 years of research data is 15 gb

  data is stored in OLTP and OLAP formats

  7 to 10 second query times

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What else?

- Data Visualization

    Real time (20 fps) interaction with 750mb data sets

    Build tools for N-Dimensional manipulation and review

    Create data reduction schemes

    Create & implement clustering algorithms

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What else?

- Integrate cellular, proteomic and genomic data

- Build usable user interfaces (HCI)

- Study algorithmic complexity with 15M cells

- Electronic signatures and traceability of data

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And finally …

- Parallelize algorithms in cost effective ways

- Build wizards for longitudinal and cross sectional studies

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Where are the useful nuggets of skill that we need to be teaching?

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Questions

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