



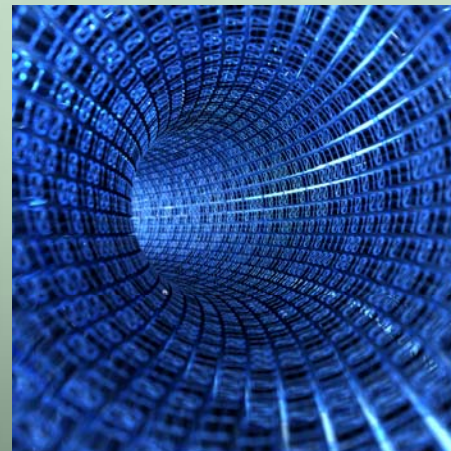
BIOINFORMATICS

An Introduction

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WHAT IS BIOINFORMATICS?

- Bioinformatics is the use of computer science, mathematics, and information theory to model and analyze biological systems, especially systems involving genetic material.



WHY IS BIOINFORMATICS SO IMPORTANT?

- Bioinformatics lets scientists process more information than ever before
- Databases store vast amounts of information that scientists can analyze
- Allows for highly detailed experiments to take place on large scales

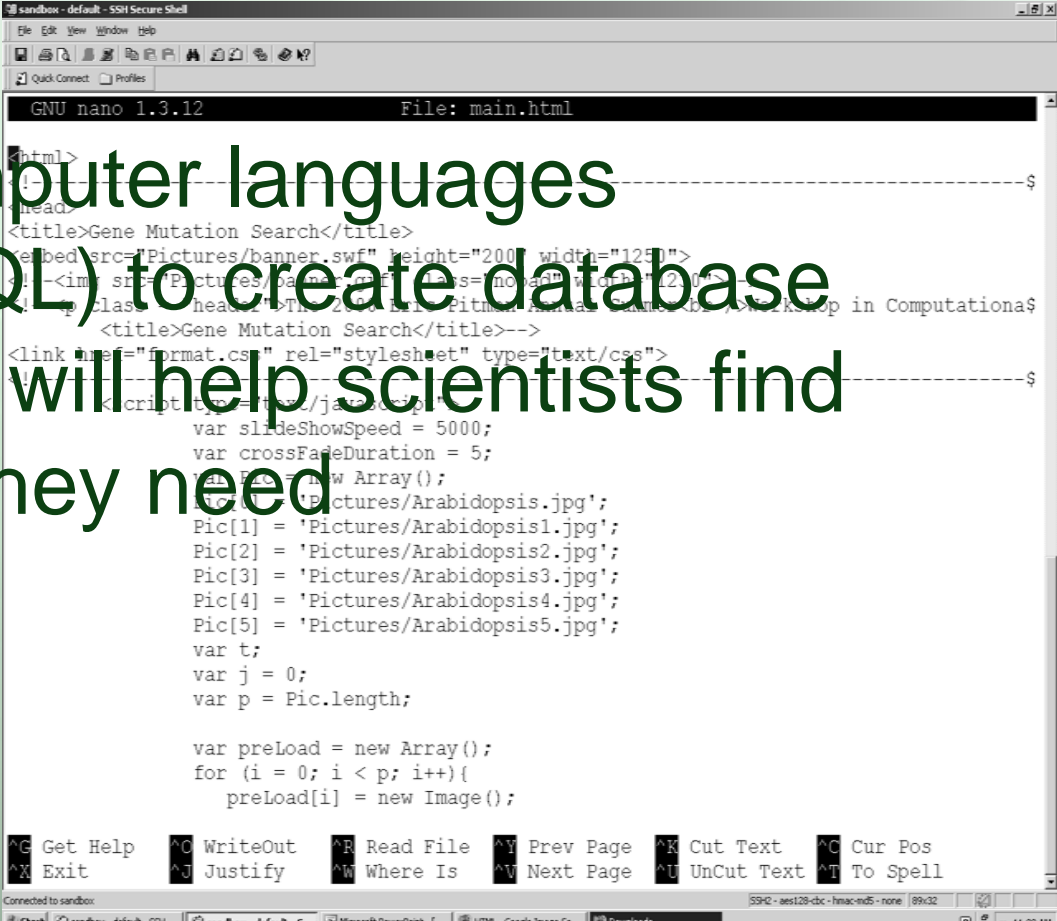


HOW IS THIS DONE?

- We can use computer languages (HTML, PHP, SQL) to create database interfaces which will help scientists find the information they need

```
<?php
while($wake == true){
    echo "More cooffee!";
    $i++;
    switch ($destination) {
        case "Las Vegas":
            echo "Bring an extra $500"; break;
        case "Amsterdam":
            echo "Bring an open mind"; break;
        case "Tokyo":
            echo "Bring a swimsuit"; break;
        case "Hawaii":
            echo "Bring a swimsuit"; break;
    }
    if ($POST["name"] == "K. Iq") {
        echo "See the boss";
        echo "Bring a swimsuit"; break;
    }
    echo "Help me fix these bugs!!!";
}

while (!$weekend) {
    jumpToNextDay();
    for($aux=1; $aux<10000; $aux++){
        echo "Repeat ... I'm not crazy and I
    }
    if (strstr($_SERVER["HTTP_USER_AGENT"], "bot")) {
        echo "You are using Internet Explorer from boss";
    }
    $sql_query($query);
}
```



```
GNU nano 1.3.12 File: main.html
<html>
<!-------$
<head>
<title>Gene Mutation Search</title>
<embed src="Pictures/banner.swf" height="200" width="1250">
<!--
<!--<img alt="The 2004 Bill Pittman Award for Best Workshop in Computational Biology" />
<title>Gene Mutation Search</title>-->
<link href="format.css" rel="stylesheet" type="text/css">
<script type="text/javascript">
    var slideShowSpeed = 5000;
    var crossFadeDuration = 5;
    var Pic = new Array();
    Pic[0] = 'Pictures/Arabidopsis.jpg';
    Pic[1] = 'Pictures/Arabidopsis1.jpg';
    Pic[2] = 'Pictures/Arabidopsis2.jpg';
    Pic[3] = 'Pictures/Arabidopsis3.jpg';
    Pic[4] = 'Pictures/Arabidopsis4.jpg';
    Pic[5] = 'Pictures/Arabidopsis5.jpg';
    var t;
    var j = 0;
    var p = Pic.length;

    var preLoad = new Array();
    for (i = 0; i < p; i++){
        preLoad[i] = new Image();
    }
</script>
^G Get Help ^O WriteOut ^R Read File ^Y Prev Page ^K Cut Text ^C Cur Pos
^X Exit ^J Justify ^W Where Is ^V Next Page ^U UnCut Text ^T To Spell
Connected to sandbox
SSH0 - aes128-ctr - hmac-md5 - none | 89x32
Start | sandbox - default - SSH ... | sandbox - default - S... | Microsoft PowerPoint - [... | HTML - Google Image Se... | Downloads
11:23 AM
```

```
<html>      HTML      </html>
```

- HTML (**H**yper**T**ext **M**arkup **L**anguage) is the language used to code web pages.
- HTML pages are static, meaning they only change when the code itself is changed.
- We would later use the HTML to develop the interface for our project.

<?php PHP ?>

- PHP (**H**ypertext **P**re**P**rocessor) is also used in web design, but is not visible to the users.
- PHP makes HTML pages dynamic (i.e. “more interactive”)
- PHP is important because it provides the bridge from a web page to a database

SELECT...

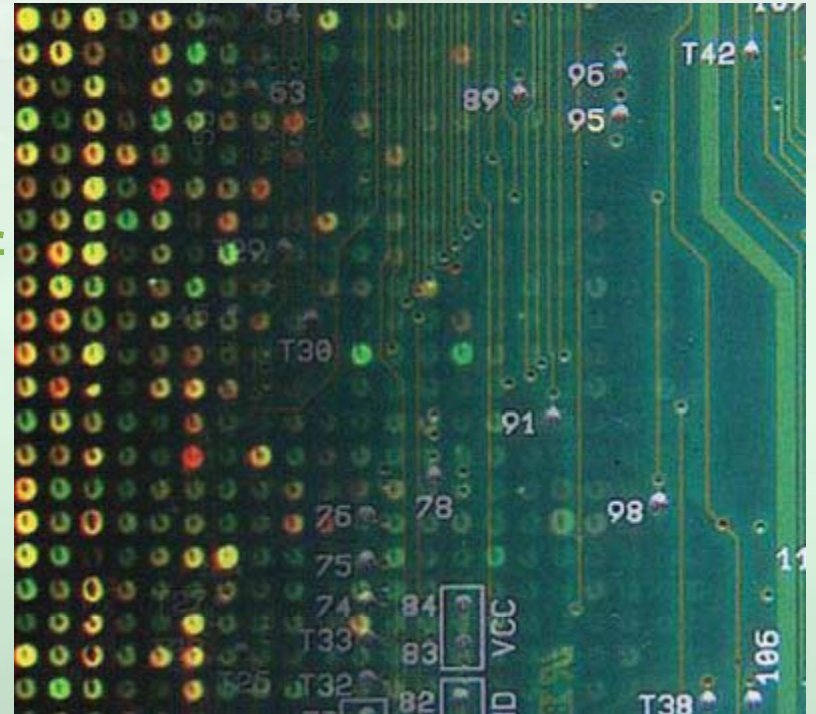
SQL

...;

- SQL (**S**tructured **Q**uery **L**anguage) is used to insert, retrieve, and modify information in a database.
- Can be used with PHP to generate search web pages

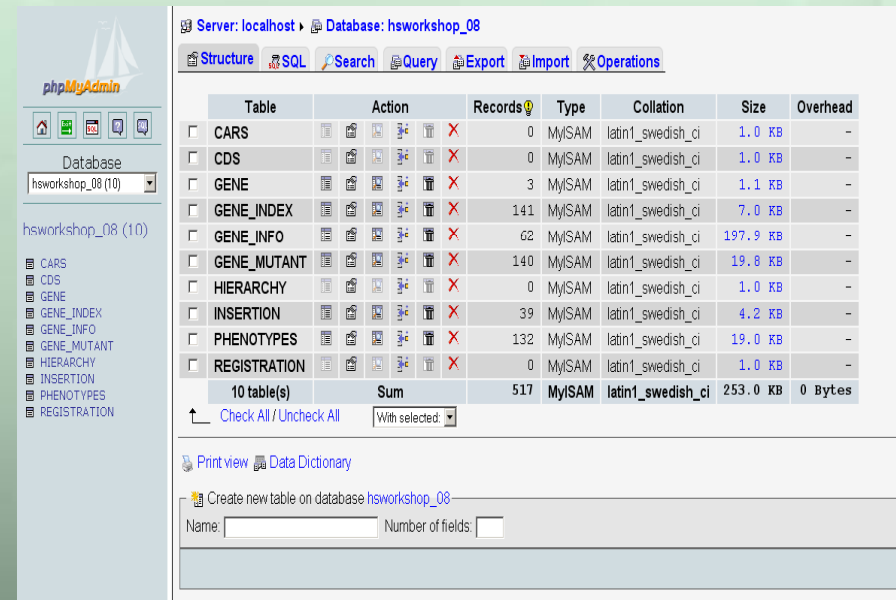
MICROARRAYS

- Microarrays are pallets of miniature test tubes that allow for fast testing of many samples
- Ones designed for DNA comparison are used to find differences between healthy cells and cancerous cells



OUR PROJECT

- Our task was to create a webpage that would allow a scientist to search the Arabidopsis database for specific types of gene mutations
- It can be narrowed down by Mutagen Type, Mutant Class, Original Source, Chromosome, and Terminal Phenotype (Dissecting) Class



The screenshot shows the phpMyAdmin interface for a MySQL database named 'hsworkshop_08'. The main area displays a table structure for 10 tables. The table list includes columns for Table, Action, Records, Type, Collation, Size, and Overhead. The tables listed are CARS, CDS, GENE, GENE_INDEX, GENE_INFO, GENE_MUTANT, HIERARCHY, INSERTION, PHENOTYPES, and REGISTRATION. A summary row at the bottom indicates 10 table(s) with a total of 517 records, MyISAM engine, latin1_swedish_ci collation, and a total size of 253.0 KB.

Table	Action	Records	Type	Collation	Size	Overhead
<input type="checkbox"/> CARS		0	MyISAM	latin1_swedish_ci	1.0 KB	-
<input type="checkbox"/> CDS		0	MyISAM	latin1_swedish_ci	1.0 KB	-
<input type="checkbox"/> GENE		3	MyISAM	latin1_swedish_ci	1.1 KB	-
<input type="checkbox"/> GENE_INDEX		141	MyISAM	latin1_swedish_ci	7.0 KB	-
<input type="checkbox"/> GENE_INFO		62	MyISAM	latin1_swedish_ci	197.9 KB	-
<input type="checkbox"/> GENE_MUTANT		140	MyISAM	latin1_swedish_ci	19.8 KB	-
<input type="checkbox"/> HIERARCHY		0	MyISAM	latin1_swedish_ci	1.0 KB	-
<input type="checkbox"/> INSERTION		39	MyISAM	latin1_swedish_ci	4.2 KB	-
<input type="checkbox"/> PHENOTYPES		132	MyISAM	latin1_swedish_ci	19.0 KB	-
<input type="checkbox"/> REGISTRATION		0	MyISAM	latin1_swedish_ci	1.0 KB	-
10 table(s)		Sum	MyISAM	latin1_swedish_ci	253.0 KB	0 Bytes

↑ Check All / Uncheck All With selected: ▾

[Print view](#) [Data Dictionary](#)

Create new table on database hsworkshop_08

Name: Number of fields: