

# Database Concepts

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# Previous week recall

## Shell/Terminal

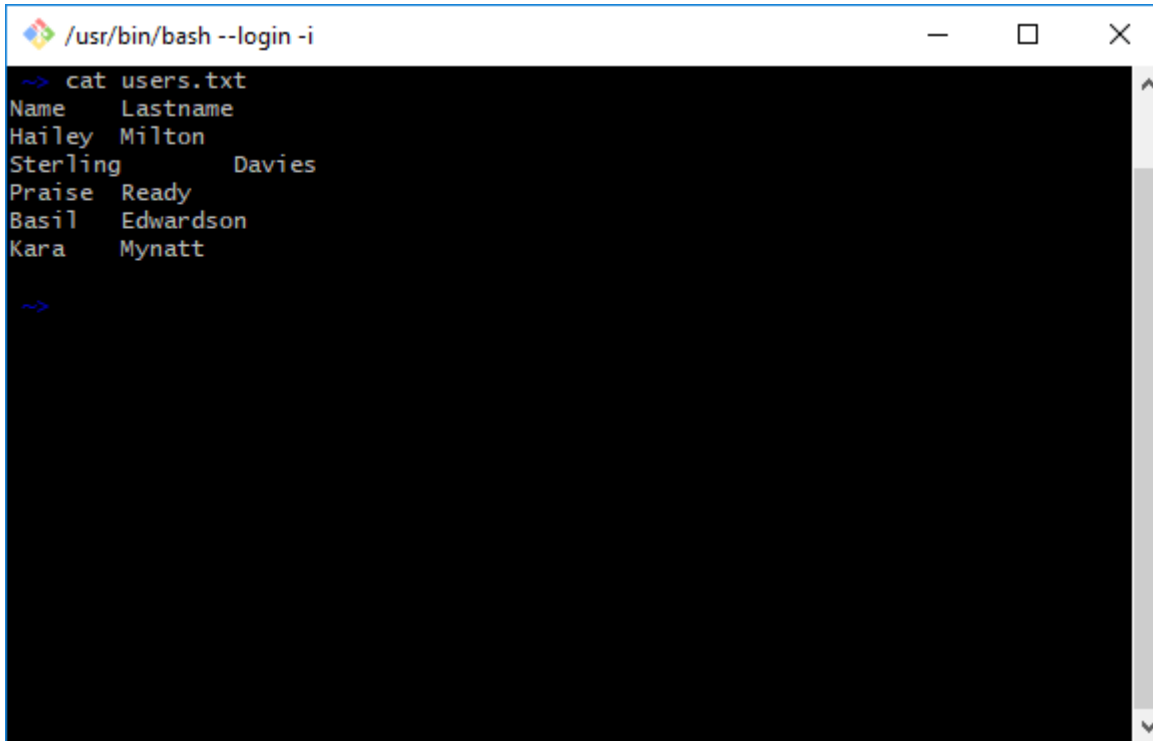
- The command-line is a text-based interface where we type commands and direct text-based input and output to the screen, to files, and to other programs.
- The environment we use is called a shell, or command-line interpreter, and there are many shells out there.
- Bash, or the Bourne-again shell is one of the most widely-used shells

# General Command Syntax

- Command Option(s) Argument(s)
- `ls -lh ~`
- `cat users.txt`
- `sort -u users.txt`
- `grep -i "connection" config.txt`

# General Command Syntax

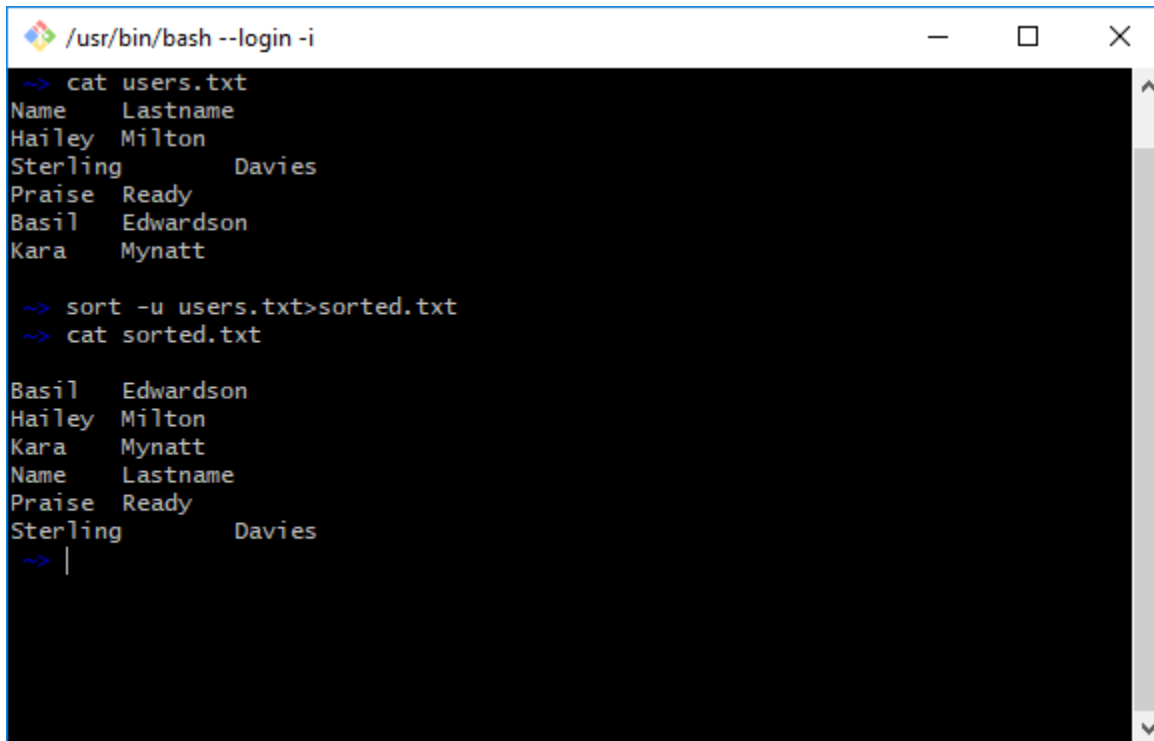
- cat users.txt

A terminal window titled '/usr/bin/bash --login -i' with standard window controls. The terminal shows the command 'cat users.txt' being executed, followed by the output of a text file. The output lists names and surnames in two columns: 'Name' and 'Lastname'. The data rows are: 'Hailey Milton', 'Sterling Davies', 'Praise Ready', 'Basil Edwardson', and 'Kara Mynatt'. The prompt '~>' is visible at the bottom.

```
/usr/bin/bash --login -i
~> cat users.txt
Name      Lastname
Hailey    Milton
Sterling  Davies
Praise    Ready
Basil     Edwardson
Kara      Mynatt
~>
```

# General Command Syntax

- `sort -u users.txt>sorted.txt`
- `cat sorted.txt`

A terminal window titled "/usr/bin/bash --login -i" with standard window controls. The terminal shows the execution of two commands. First, "cat users.txt" displays the contents of a file named "users.txt", which contains a header "Name Lastname" and five lines of data: "Hailey Milton", "Sterling Davies", "Praise Ready", "Basil Edwardson", and "Kara Mynatt". Second, "sort -u users.txt>sorted.txt" is executed, followed by "cat sorted.txt", which displays the same five lines of data but in alphabetical order: "Basil Edwardson", "Hailey Milton", "Kara Mynatt", "Praise Ready", and "Sterling Davies". The prompt "~>|" is visible at the bottom.

```
/usr/bin/bash --login -i
~> cat users.txt
Name    Lastname
Hailey  Milton
Sterling        Davies
Praise   Ready
Basil    Edwardson
Kara     Mynatt

~> sort -u users.txt>sorted.txt
~> cat sorted.txt
Basil    Edwardson
Hailey   Milton
Kara     Mynatt
Name     Lastname
Praise   Ready
Sterling        Davies
~> |
```

# Shortcuts

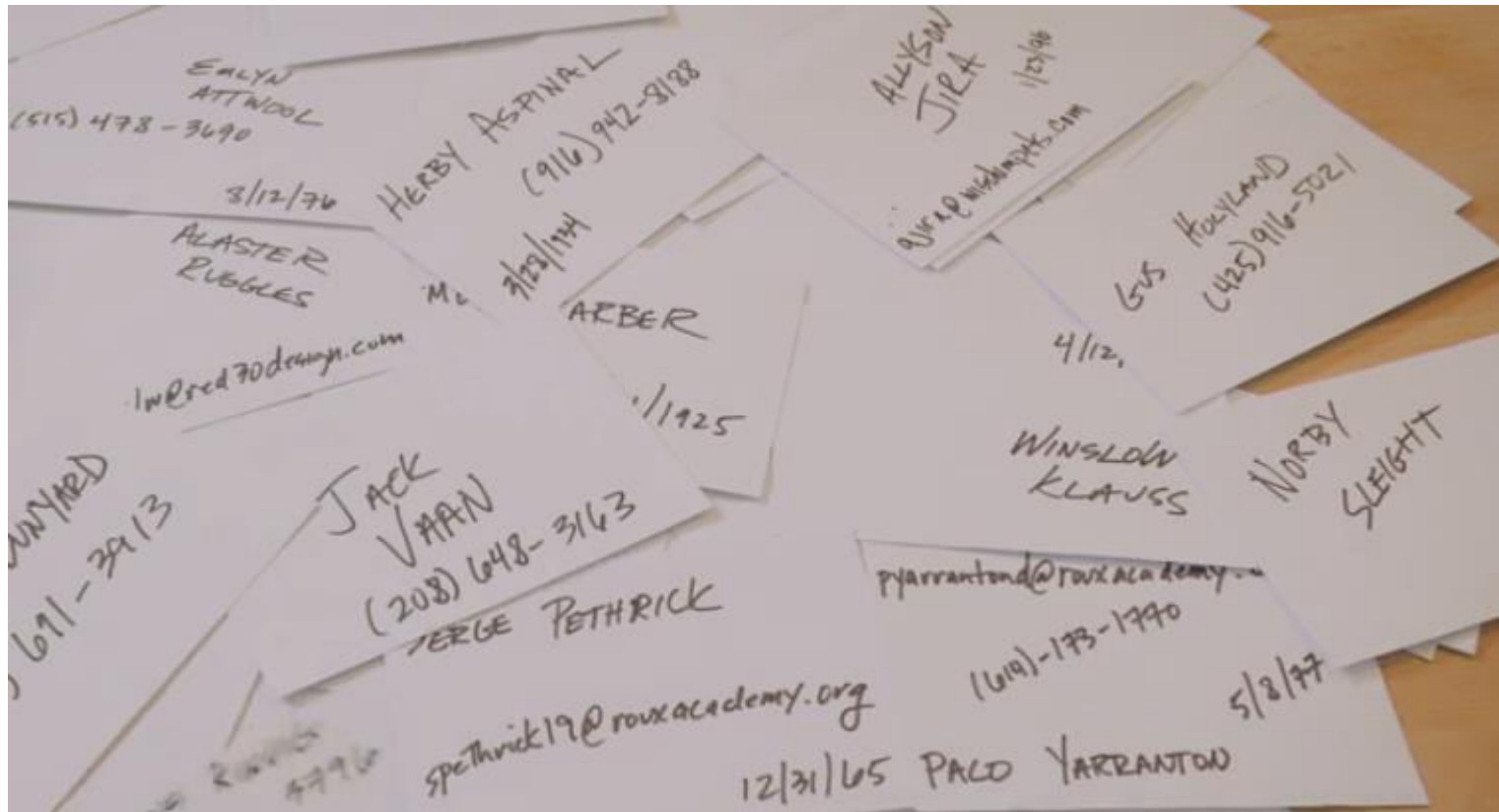
- Autocomplete with “tab”
- ‘clear’ to clear the screen
- “ctrl-a” move cursor to the beginning
- “ctrl-e” move cursor to the end
- “ctrl-left arrow” move left one word
- “ctrl-right arrow” move right one word
- “up arrow” recalls previous command
- “down arrow” scroll previous command

# Databases

- Databases let us work with large amounts of data efficiently
- They make updating data easy and reliable, and they help to ensure accuracy
- They offer security features to control access to information
- They help us avoid redundancy
- A database is a structure that stores information in an organized, consistent, reliable, and searchable way
- Different kind of databases (relational, non-relational, ...)

# Database concepts

- Ex: peace of information in cards





# Structures

- Turned into spreadsheet

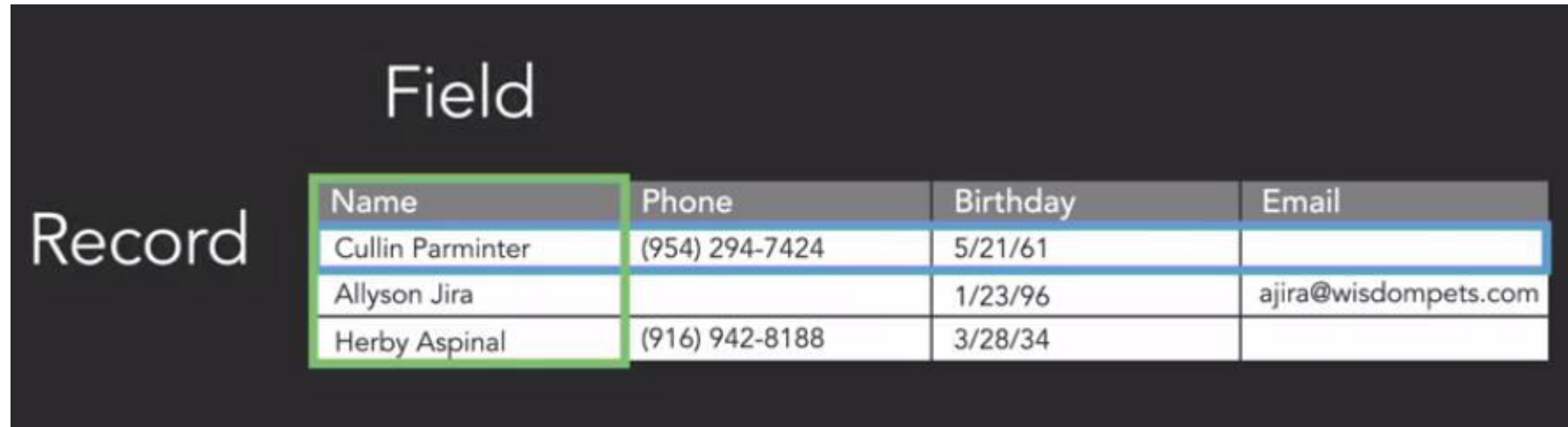
Name	Phone	Birthday	Email
Cullin Parminter	(954) 294-7424	5/21/61	
Allyson Jira		1/23/96	ajira@wisdompets.com
Herby Aspinal	(916) 942-8188	3/28/34	

- Rows and columns

Column					
		Name	Phone	Birthday	Email
Row		Cullin Parminter	(954) 294-7424	5/21/61	
		Allyson Jira		1/23/96	ajira@wisdompets.com
		Herby Aspinal	(916) 942-8188	3/28/34	

# Structures

- Record and field



The diagram illustrates the relationship between a Record and its Fields. A table with four columns (Name, Phone, Birthday, Email) is shown. The first column is highlighted with a green border and labeled 'Record'. The other three columns are highlighted with a blue border and labeled 'Field'.

Name	Phone	Birthday	Email
Cullin Parminter	(954) 294-7424	5/21/61	
Allyson Jira		1/23/96	ajira@wisdompets.com
Herby Aspinal	(916) 942-8188	3/28/34	

# Structures

- One card is one record or one row

Name	Phone	Birthday	Email
Cullin Parminter	(954) 294-7424	5/21/61	
Allyson Jira		1/23/96	ajira@wisdompets.com
Herby Aspinal	(916) 942-8188	3/28/34	

Cullin Parminter  
(954) 294-7424  
5/21/61

Allyson Jira  
1/23/96  
ajira@wisdompets.com

Herby Aspinal  
(916) 942-8188  
3/28/1934

# Structures

Name	Phone	Birthday	Email
Cullin Parminter	(954) 294-7424	5/21/61	
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Cullin Parminter

(954) 294-7424

5/21/61

Allyson Jira

1/23/96

ajira@wisdompets.com

Herby Aspinal

(916) 942-8188

3/28/1934

# Benefits

- Spreadsheets example

Name	Phone	Birthday	Order 1	Order 2
Amby Harber	(919) 557-3321	6/21/1925	Classic Burger	Cheesecake
Paco Yarranton	(614) 173-1770	5/8/1977	Handcrafted Pizza	House Salad
Cullin Parminter	(954) 294-7424	5/2/1961	Apple Pie	Garden Buffet
Allyson Jira	(315) 720-5302	1/23/1996	Mini Cheeseburgers	French Onion Soup
Herby Aspinal	(916) 942-8188	3/28/1934	Cafe Latté	Crème Brûlée

- Cards of dishes

Classic Burger	Cheesecake	Apple Pie
Garden Buffet	Cafe Latte	Crème Brûlée

# Tables

## Customers

FirstName	LastName	Phone	Birthday
Cullin	Parminter	(954) 294-7424	1961-05-21
Amby	Harber	(919) 557-3321	1925-06-21
Herby	Aspinal	(916) 942-8188	1934-03-28

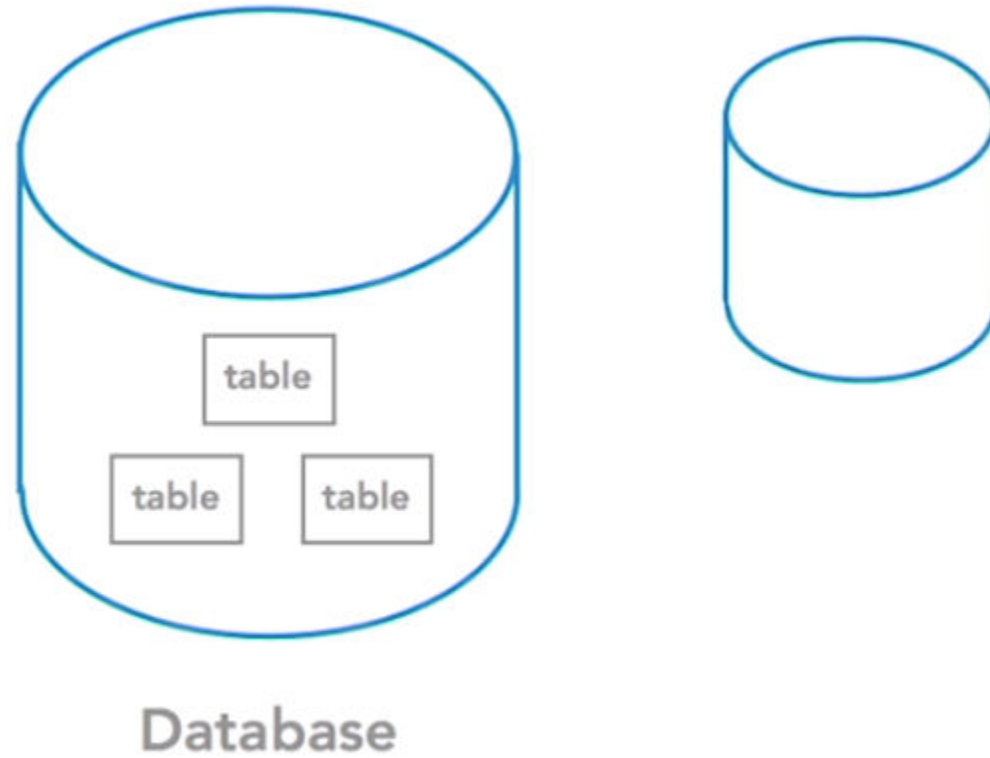
## Orders

Order
Classic Burger
Apple Pie
Cheesecake
Cafe Latte
Crème Brûlée
Garden Buffet

Orders Table

Customers Table

# Databases



# Tables

FirstName (text)	LastName (text)	HireDate (date)	Grade (numeric)	Salary (currency)
Alice	Mann	4/4/2009	4	75000
James	Black	3/1/2010	4	75000
Calista	Guerra	10/1/2006	6	80000
Fay	Fitzgerald	7/21/2002	7	100000



# Columns

- Almost all tables in a database will require a key
- Contain a guaranteed unique value for each row

Unique		Not Unique		
	153			
	374			
	352			
	376			
	153			

# Uniqueness

EmployeeID (numeric, unique)	FirstName (text)	LastName (text)	HireDate (date)	Grade (numeric)	Salary (currency)	SocialSecurity (text, unique)
507	Alice	Mann	4/4/2009	4	75000	55-65-1231
602	James	Black	3/1/2010	4	75000	55-65-1231
312	Calista	Guerra	10/1/2006	6	80000	54-23-1255
78	Fay	Fitzgerald	7/21/2002	7	100000	87-92-2341
523	John	Bowen	11/11/2011	3	45000	43-23-1234

# Primary Key

- Identifies one and only one row in this table
- Ex: Employee ID, Social Security number

EmployeeID (numeric, unique)	FirstName (text)	LastName (text)	HireDate (date)	Grade (numeric)	Salary (currency)	SocialSecurity (text, unique)
507	Alice	Mann	4/4/2009	4	75000	55-65-1231
602	James	Black	3/1/2010	4	75000	55-65-1231
312	Calista	Guerra	10/1/2006	6	80000	54-23-1255
78	Fay	Fitzgerald	7/21/2002	7	100000	87-92-2341
523	John	Bowen	11/11/2011	3	45000	43-23-1234