Medical Informatics

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2019

Score Details

- Take Homes (20%)
- Wikipedia (60%)
- Seminar (20%)
- Final Exam (Online / Multiple Choices)

Database Structure

Primary, secondary keys, relational databases

Spreadsheet

- Simple form of a database
- Columns (fields) contain specific info
  - Name, address, date, number
- Rows (records) represent individual entries
  - Individual person, specific DNA sequence
- Each record has unique identifier
  - Primary key unambiguously identifies record
  - Duplicates of primary key not allowed

Election data/Primary Key

cand	cand/year	Candidate	Year	Party	EV	Pop Vote
wjc1	1992d1	William J. Clinton	1992	Democrat	370	44,908,233
ghwb1	1992r1	George H. W. Bush	1992	Republican	168	39,102,282
hrp1	1992i1	H. Ross Perot	1996	Indep.	0	19,741,048
wjc1	1996d1	William J. Clinton	1996	Democrat	379	47,401,185
rd1	1996r1	Robert Dole	1996	Republican	159	39,197,469
hrp1	1996rf1	H. Ross Perot	1996	Reform	0	8,085,294
gwb1	2000r1	George W. Bush	2000	Republican	271	50,456,169
ag1	2000d1	Al Gore	2000	Democrat	266	50,996,116
rn1	2000g1	Ralph Nader	2000	Green	0	2,695,696
gwb1	2004r1	George W. Bush	2004	Republican	286	62,040,606
jfk2	2004d1	John F. Kerry	2004	Democrat	252	59,028,109
rn1	2004i1	Ralph Nader	2004	Independent	0	411,304
bho1	2008d1	Barack Obama	2008	Democrat	365	69,456,897
jsm1	2008r1	John McCain	2008	Republican	173	59,934,814
bho1	2012d1	Barack Obama	2012	Democrat	332	65,917,119
wmr1	2012r1	Willard Mitt Romney	2012	Republican	206	60,932,078
gj1	201211	Gary Johnson	2012	Libertarian	0	1,275,886
js1	2012g1	Jill Stein	2012	Green	0	469,015

- What is the primary key in this database?
- How does cand/year differ from cand in uniqueness?

http://www.imdb.com/title/tt0268978/

Oversimplified IMDB

- Primary Key = Movie ID

Movie Title	Year	Movie ID
American Gangster	2007	tt0765429
3:10 to Yuma	2007	tt0381849
A Good Year	2006	tt0401445
Cinderella Man	2005	tt0352248
Master and Commander	2003	tt0311113
A Beautiful Mind	2001	tt0268978
Gladiator	2000	tt0172495
Gladiator	1992	tt0104346

Connected Databases

Movie Title	Year	Movie ID
A Beautiful Mind	2001	tt0268978

Movie ID	Title	Year	Actor	Actor ID
tt0268978	A Beautiful Mind	2001	Russell Crowe	nm0000128
tt0268978	A Beautiful Mind	2001	Ed Harris	nm0000438
tt0268978	A Beautiful Mind	2001	Jennifer Connelly	nm0000124
tt0268978	A Beautiful Mind	2001	Adam Goldberg	nm0004965
tt0268978	A Beautiful Mind	2001	Paul Bettany	nm0079273
tt0268978	A Beautiful Mind	2001	Christopher Plummer	nm0001626

Actor ID	Actor Name	Date of Birth	Country of Birth	Movie Title	Year	Movie ID
nm0000128	Russell Crowe	April 7, 1964	New Zealand	The Nice Guys	2016	tt3799694
nm0000128	Russell Crowe	April 7, 1964	New Zealand	Fathers & Daughters	2015	tt2582502
nm0000128	Russell Crowe	April 7, 1964	New Zealand	The Water Diviner	2014	tt3007512
nm0000128	Russell Crowe	April 7, 1964	New Zealand	Noah	2014	tt1959490
nm0000128	Russell Crowe	April 7, 1964	New Zealand	Winter's Tale	2014	tt1837709
nm0000128	Russell Crowe	April 7, 1964	New Zealand	Man of Steel	2013	tt0770828
nm0000128	Russell Crowe	April 7, 1964	New Zealand	Broken City	2013	tt1235522
nm0000128	Russell Crowe	April 7, 1964	New Zealand	Les Misérables	2012	tt1707386
nm0000128	Russell Crowe	April 7, 1964	New Zealand	The Man with the Iron Fists	2012	tt1258972
nm0000128	Russell Crowe	April 7, 1964	New Zealand	Republic of Doyle	2012	tt1297754
nm0000128	Russell Crowe	April 7, 1964	New Zealand	The Next Three Days	2010	tt1458175
nm0000128	Russell Crowe	April 7, 1964	New Zealand	Robin Hood	2010	tt0955308
nm0000128	Russell Crowe	April 7, 1964	New Zealand	State of Play	2009	tt0473705
nm0000128	Russell Crowe	April 7, 1964	New Zealand	Tenderness	2009	tt0494864
nm0000128	Russell Crowe	April 7, 1964	New Zealand	Body of Lies	2008	tt0758774
nm0000128	Russell Crowe	April 7, 1964	New Zealand	American Gangster	2007	tt0765429
nm0000128	Russell Crowe	April 7, 1964	New Zealand	3:10 to Yuma	2007	tt0381849
nm0000128	Russell Crowe	April 7, 1964	New Zealand	A Good Year	2006	tt0401445
nm0000128	Russell Crowe	April 7, 1964	New Zealand	Cinderella Man	2005	tt0352248
nm0000128	Russell Crowe	April 7, 1964	New Zealand	Master and Commander	2003	tt0311113
nm0000128	Russell Crowe	April 7, 1964	New Zealand	A Beautiful Mind	2001	tt0268978
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Connected Databases

Movie Title	Year	Movie ID
A Beautiful Mind	2001	tt0268978

Primary Key

Secondary Key

Movie ID	Title	Year	Actor	Actor ID
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tt0268978	A Beautiful Mind	2001	Ed Harris	nm0000438
tt0268978	A Beautiful Mind	2001	Jennifer Connelly	nm0000124
tt0268978	A Beautiful Mind	2001	Adam Goldberg	nm0004965
tt0268978	A Beautiful Mind	2001	Paul Bettany	nm0079273
tt0268978	A Beautiful Mind	2001	Christopher Plummer	nm0001626

Primary Key

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Relational Database

- Avoid too many fields
- Databases link to other database
  - Each database called 'relation'
- Secondary key in one database can serve as primary key in another database
- Internet: large relational database
  - Made up of webpages (records)
  - URLs represent primary keys in smaller databases
    - other websites

Summary

- Recognize primary keys
  - Most unique identifier for a record
  - Usually series of numbers/letters
- Relational databases link related databases
  - IMDB: movie DB and actor DB
  - NCBI: nucleotide DB and protein DB