

# **iCongress**

A Database Design Proposal

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## **Executive Summary**

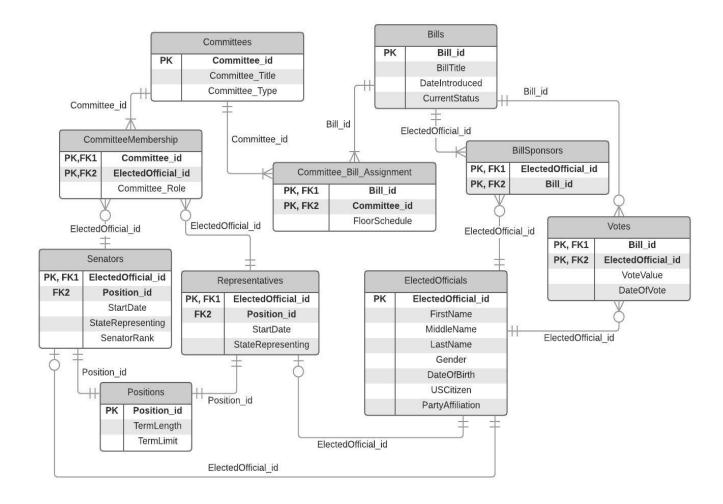
#### **Overview**

Due to a doomsday like series of events Donald Trump was elected president of the United States. His first action as president was to paint the White House gold and his second was to declare war on every civilized nation from Albania to Zimbabwe. However, according to Article One, Section Eight of the Constitution a formal declaration of war is a Congressional matter and thus must be decided by Congress. President Trump, always a stickler for the rules, introduced a proposal of war to Congress. The proposal was carefully examined over lunch, voted upon, and unanimously supported. The American public reacted with overwhelming disgust. In the following days and weeks sentiment felt towards Congress shifted from unsure to dubiously skeptical. A small group of tech savvy millennials venture to build a website detailing what their elected officials in Congress support for the purpose of increased transparency.

## **Objective**

This document outlines a database system to record what elected officials in Congress support. Elected officials in Congress are either Senators or Representatives in the House of Representatives. Congress divides its work between committees where they discuss bills. Every bill must have a sponsor and every bill must be voted on. This document will provide a technical overview of the database including ER diagrams, tables, functional dependencies, views, reports, and security. This system is designed and tested on PostgreSQL 9.5.2.

## **Entity Relationship Diagram**



## **Tables**

## **Table: Bills**

**Purpose:** This table is used to store Bills by their Bill\_id along with their associated bill title, date the bill was introduced, and the bill's current status.

#### **Create Statement:**

## **Functional Dependencies:**

(Bill\_id) → BillTitle, DateIntroduced, CurrentStatus

	bill_id character varying(10)	billtitle text	dateintroduced date	currentstatus currentstatuses
1	aaaaaaaaa1	Freedom of Trump Act	2016-01-01	introduced
2	aaaaaaaaa2	Right to Arm Bears	2016-01-01	introduced
3	abnmz4oaa1	Freedom to Trump	2017-01-13	introduced
4	dafazjjaa2	Right to Arm Bears	2017-01-20	introduced
5	zafaaaaaa3	Ban all bike lanes	2017-01-25	introduced
6	ihjr58a9y4	Tuesday is ice cream day	2017-02-03	introduced
7	y2jro0a1k5	All magic tricks are real	2017-02-03	introduced

## **Table: BillSponsors**

**Purpose**: This table is used to store a Bill's sponsors. The records kept are elected officials by ElectedOfficial\_id and the Bill they sponsor by Bill\_id.

#### **Create Statement:**

```
CREATE TABLE IF NOT EXISTS BillSponsors (
    ElectedOfficial_id VARCHAR(5) NOT NULL,
    Bill_id VARCHAR(10) NOT NULL,
    PRIMARY KEY(ElectedOfficial_id, Bill_id),
    FOREIGN KEY(ElectedOfficial_id) REFERENCES ElectedOfficials(ElectedOfficial_id),
    FOREIGN KEY(Bill_id) REFERENCES Bills(Bill_id)
);
```

## **Functional Dependencies:**

(ElectedOfficial\_id, Bill\_id)

	electedofficial_id character varying(5)	bill_id character varying(10)
1	hp214	abnmz4oaa1
2	z1uz6	dafazjjaa2
3	cr510	zafaaaaaa3
4	hp212	zafaaaaaa3
5	hp219	ihjr58a9y4
6	hp219	y2jro0a1k5
7	eo1z1	y2jro0a1k5
8	a4hn2	y2jro0a1k5

#### **Table: Elected Officials**

**Purpose**: This table holds information for every elected official in the iCongress database including Full name, gender, date of birth, Citizenship, and party affiliation.

#### **Create Statement:**

```
CREATE TABLE IF NOT EXISTS ElectedOfficials (
    ElectedOfficial_id VARCHAR(5) NOT NULL UNIQUE,
    FirstName TEXT NOT NULL,
    MiddleName TEXT NOT NULL,
    LastName TEXT NOT NULL,
    Gender Genders,
    DateOfBirth DATE NOT NULL,
    USCitizen BOOLEAN DEFAULT TRUE,
    PartyAffiliation TEXT NOT NULL CHECK(PartyAffiliation IN ('Republican', 'Democrat','Other')),
    PRIMARY KEY (ElectedOfficial_id)
);
```

## **Functional Dependencies:**

(ElectedOfficial\_id) → FirstName, MiddleName, LastName, Gender, DateOfBirth, USCitizen, PartyAffiliation

	electedofficial_id character varying(5)	firstname text	middlename text	lastname text	gender genders	dateofbirth date	uscitizen boolean	partyaffiliation text
1	eo1z1	Alexander	Daddy	Hamilton	Male	1755-01-11	t	Other
2	a4hn2	Benjamin	Daddy	Franklin	Male	1706-01-17	t	Other
3	b3zi3	John	E	McCain	Male	1936-08-29	t	Republican
4	jzkq4	Jeff	J	Flake	Male	1962-12-31	t	Republican
5	d3kz5	Bill	С	Nelson	Male	1942-09-29	t	Democrat
6	z1uz6	Marco	L	Rubio	Male	1971-05-28	t	Republican
7	y3ub7	Chuck	N	Schumer	Male	1950-10-23	t	Democrat
8	m7po8	Kirsten	D	Gillibrand	Female	1966-12-26	t	Democrat
9	k0ti9	Dianne	Α	Feinstein	Female	1933-06-22	t	Democrat
10	cr510	Barbara	N	Boxer	Female	1940-10-11	t	Democrat
11	sp211	Barbara	I	Boxer	Female	1940-10-11	t	Democrat
12	hp212	Matt	E	Salmon	Male	1958-10-11	t	Republican
13	hp213	Raul	L	Grijalva	Male	1948-10-11	t	Democrat
14	hp214	Jeff	С	Denham	Male	1967-10-11	t	Republican
15	hp215	Paul	R	Cook	Male	1943-10-11	t	Republican
16	hp216	Ami	Α	Bera	Male	1965-10-11	t	Republican
17	hp217	Tom	I	Rooney	Male	1970-10-11	t	Republican
18	hp218	Patrick	G	Murphy	Male	1983-10-11	t	Republican
19	hp219	Gregory	Q	Meeks	Male	1953-10-11	t	Democrat

#### **Table: Senators**

<u>**Purpose:**</u> This table contains information about Senators in the iCongress database. Every state has two Senators. The Senator that started most recently is referred to as the Junior Senator.

#### **Create Statement:**

```
CREATE TABLE IF NOT EXISTS Senators (
    ElectedOfficial_id VARCHAR(5) NOT NULL UNIQUE,
    Position_id PositionValues NOT NULL CHECK(Position_id='Senator'),
    StartDate DATE NOT NULL,
    StateRepresenting States NOT NULL,
    SenatorRank SenatorRanks NOT NULL,
    PRIMARY KEY(ElectedOfficial_id),
    FOREIGN KEY(ElectedOfficial_id) REFERENCES ElectedOfficials(ElectedOfficial_id),
    FOREIGN KEY(Position_id) REFERENCES Positions(Position_id)
);
```

## **Functional Dependencies:**

(ElectedOfficial\_id) → Position\_id, StartDate, StateRepresenting, SenatorRank

	electedofficial_id character varying(5)	position_id positionvalues	startdate date	staterepresenting states	senatorrank senatorranks
1	b3zi3	Senator	1987-01-03	Arizona	Senior
2	jzkq4	Senator	2013-01-03	Arizona	Junior
3	d3kz5	Senator	2001-01-03	Florida	Senior
4	z1uz6	Senator	2011-01-03	Florida	Junior
5	y3ub7	Senator	1999-01-03	New York	Senior
6	m7po8	Senator	2009-01-26	New York	Junior
7	k0ti9	Senator	1992-10-10	California	Senior
8	cr510	Senator	1993-01-03	California	Junior

## **Table: Representatives**

**Purpose:** This table contains information about Representatives in the iCongress database. Every state has several Representatives in the House of Representatives.

#### **Create Statement:**

```
CREATE TABLE IF NOT EXISTS Representatives (
    ElectedOfficial_id VARCHAR(5) NOT NULL UNIQUE,
    Position_id PositionValues NOT NULL CHECK(Position_id='Representative'),
    StartDate DATE NOT NULL,
    StateRepresenting States NOT NULL,
    PRIMARY KEY(ElectedOfficial_id, Position_id),
    FOREIGN KEY(ElectedOfficial_id) REFERENCES ElectedOfficials(ElectedOfficial_id),
    FOREIGN KEY(Position_id) REFERENCES Positions(Position_id)
);
```

## **Functional Dependencies:**

(ElectedOfficial\_id) → Position id, StartDate, StateRepresenting

	electedofficial_id character varying(5)	position_id positionvalues	startdate date	staterepresenting states
1	hp212	Representative	2003-01-30	Arizona
2	hp213	Representative	2013-01-30	Arizona
3	hp214	Representative	2011-01-30	California
4	hp215	Representative	2013-01-30	California
5	hp216	Representative	2013-01-30	California
6	hp217	Representative	2009-01-30	Florida
7	hp218	Representative	2013-01-30	Florida
8	hp219	Representative	1998-01-30	New York

#### **Table: Committees**

<u>**Purpose**</u>: Congress conducts business in committees. Committees come in three types Senate Committees exclusively composed of members of the Senate, House Committees exclusively composed of members of the House of Representatives, and Joint Committees that are composed of both branches of Congress. This table holds Committees and the type of committee.

#### **Create Statement:**

## **Functional Dependencies:**

(Committee\_id) → Committee\_Title, Committee\_Type

	committee_id character varying(6)	committee_title text	committee_type committee_types
1	uta01t	Argiculture, Nutrition, and Forestry	senate
2	utv8tl	Energy and Natural Resources	senate
3	pop99b	Health, Education, Labor, and Pensions	senate
4	yay7n1	Foreign Relations	joint
5	vox1jc	Rules and Administration	house
6	101sto	Governmental Affairs	house
7	ei78b2	Small Business and Entrepreneurship	house

## **Table: CommitteeMembership**

**Purpose:** This table holds members of a committee and also the role that each member plays on a particular committee.

#### **Create Statement:**

## **Functional Dependencies:**

(Committee\_id, ElectedOfficial\_id) → Committee Role

	committee_id character varying(20)	electedofficial_id character varying(5)	committee_role committee_roles
1	uta01t	eo1z1	Chairman
2	uta01t	a4hn2	Ranking Member
3	uta01t	b3zi3	Vice Chairman
4	uta01t	jzkq4	Ex Officio
5	uta01t	d3kz5	Member
6	utv8tl	eo1z1	Chairman
7	utv8tl	a4hn2	Ranking Member
8	pop99b	b3zi3	Vice Chairman
9	ei78b2	jzkq4	Ex Officio
10	yay7n1	d3kz5	Member

## **Table:** Committee\_Bill\_Assignment

**Purpose:** This table holds which bills are assigned to a particular committee for review along with the date that that the bill will be on the schedule for the committee.

#### **Create Statement:**

```
CREATE TABLE IF NOT EXISTS Committee_Bill_Assignment (
Bill_id VARCHAR(10) NOT NULL,
Committee_id VARCHAR(20) NOT NULL,
FloorSchedule DATE NOT NULL,
PRIMARY KEY(Bill_id, Committee_id),
FOREIGN KEY(Bill_id) REFERENCES Bills(Bill_id),
FOREIGN KEY(Committee_id) REFERENCES Committees(Committee_id)
);
```

## **Functional Dependencies:**

(Bill\_id, Committee\_id)  $\rightarrow$  FloorSchedule

	bill_id character varying(10)	committee_id character varying(20)	floorschedule date
1	abnmz4oaa1	pop99b	2017-04-08
2	dafazjjaa2	ei78b2	2017-03-21
3	zafaaaaaa3	yay7n1	2017-03-10
4	dafazjjaa2	yay7n1	2017-03-19
5	ihjr58a9y4	pop99b	2017-05-05
6	y2jro0a1k5	utv8tl	2017-08-30

#### **Table: Votes**

**<u>Purpose</u>**: This table holds records of elected officials, bills, how the elected official voted on that bill, and the date of the vote.

## **Create Statement:**

```
CREATE TABLE IF NOT EXISTS Votes (
                   VARCHAR(30) NOT NULL,
 ElectedOfficial_id VARCHAR(5) NOT NULL,
 VoteValue
                   VoteValues NOT NULL,
 DateOfVote
                   DATE
                               NOT NULL,
 PRIMARY KEY (ElectedOfficial_id, Bill_id),
 FOREIGN KEY (Bill_id) REFERENCES Bills (Bill_id),
 FOREIGN KEY (ElectedOfficial_id) REFERENCES ElectedOfficials (ElectedOfficial_id)
);
CREATE TYPE VoteValues AS ENUM (
   'For',
   'Against'
);
```

## **Functional Dependencies:**

(ElectedOfficial\_id, Bill\_id) → VoteValue, DateOfVote

	bill_id character varying(30)	electedofficial_id character varying(5)	votevalue votevalues	dateofvote date
1	abnmz4oaa1	eo1z1	For	2018-02-01
2	abnmz4oaa1	d3kz5	Against	2018-02-01
3	dafazjjaa2	k0ti9	For	2018-03-18
4	dafazjjaa2	sp211	Against	2018-03-18
5	dafazjjaa2	cr510	For	2018-03-18

#### **Table: Positions**

**Purpose:** The Positions table holds information about the length of a term and whether the there is a term limit for a given Congressional Position.

## **Create Statement:**

```
CREATE TABLE IF NOT EXISTS Positions (
   Position_id PositionValues NOT NULL UNIQUE,
   TermLength INT NOT NULL,
   TermLimit BOOLEAN NOT NULL,
   PRIMARY KEY (Position_id)
);

CREATE TYPE PositionValues AS ENUM (
   'Senator',
   'Representative'
);
```

## **Functional Dependencies:**

(Position\_id) → TermLength, TermLimit

	position_id positionvalues	termlength integer	termlimit boolean
1	Senator	6	f
2	Representative	2	f

## **Views**

View: SenatorsByNameAndState

## **Create Statement:**

## **Sample Output:**

	firstname text	lastname text	position_id positionvalues	staterepresenting states	startdate date	senatorrank senatorranks
1	John	McCain	Senator	Arizona	1987-01-03	Senior
2	Jeff	Flake	Senator	Arizona	2013-01-03	Junior
3	Bill	Nelson	Senator	Florida	2001-01-03	Senior
4	Marco	Rubio	Senator	Florida	2011-01-03	Junior
5	Chuck	Schumer	Senator	New York	1999-01-03	Senior
6	Kirsten	Gillibrand	Senator	New York	2009-01-26	Junior
7	Dianne	Feinstein	Senator	California	1992-10-10	Senior
8	Barbara	Boxer	Senator	California	1993-01-03	Junior

ON Senators.ElectedOfficial\_id=ElectedOfficials.ElectedOfficial\_id;

## **View:** RepresentativesByNameAndState

## **Create Statement:**

ON Representatives.ElectedOfficial\_id=ElectedOfficials.ElectedOfficial\_id;

	firstname text	lastname text	position_id positionvalues	staterepresenting states	startdate date
1	Matt	Salmon	Representative	Arizona	2003-01-30
2	Raul	Grijalva	Representative	Arizona	2013-01-30
3	Jeff	Denham	Representative	California	2011-01-30
4	Paul	Cook	Representative	California	2013-01-30
5	Ami	Bera	Representative	California	2013-01-30
6	Tom	Rooney	Representative	Florida	2009-01-30
7	Patrick	Murphy	Representative	Florida	2013-01-30
8	Gregory	Meeks	Representative	New York	1998-01-30

## <u>View:</u> CommitteeMembershipByTitleAndMemberName

## **Create Statement:**

	committee_title text	committee_type committee_types	firstname text	lastname text	committee_role committee_roles
1	Argiculture, Nutrition, and Forestry	senate	Alexander	Hamilton	Chairman
2	Argiculture, Nutrition, and Forestry	senate	Benjamin	Franklin	Ranking Member
3	Argiculture, Nutrition, and Forestry	senate	John	McCain	Vice Chairman
4	Argiculture, Nutrition, and Forestry	senate	Jeff	Flake	Ex Officio
5	Argiculture, Nutrition, and Forestry	senate	Bill	Nelson	Member
6	Energy and Natural Resources	senate	Alexander	Hamilton	Chairman
7	Energy and Natural Resources	senate	Benjamin	Franklin	Ranking Member
8	Health, Education, Labor, and Pensions	senate	John	McCain	Vice Chairman
9	Small Business and Entrepreneurship	house	Jeff	Flake	Ex Officio
10	Foreign Relations	joint	Bill	Nelson	Member

## **View:** ElectedOfficialVoteByBill

## **Create Statement:**

	billtitle text	firstname text	lastname text	partyaffiliation text	votevalue votevalues
1	Freedom to Trump	Alexander	Hamilton	Other	For
2	Freedom to Trump	Bill	Nelson	Democrat	Against
3	Right to Arm Bears	Dianne	Feinstein	Democrat	For
4	Right to Arm Bears	Barbara	Boxer	Democrat	Against
5	Right to Arm Bears	Barbara	Boxer	Democrat	For
6	Right to Arm Bears	Marco	Rubio	Republican	For
7	Right to Arm Bears	Raul	Grijalva	Democrat	For
8	Right to Arm Bears	Paul	Cook	Republican	For
9	Right to Arm Bears	Tom	Rooney	Republican	For
10	Right to Arm Bears	Jeff	Denham	Republican	For
11	Right to Arm Bears	Ami	Bera	Republican	For
12	Tuesday is ice cream day	Jeff	Denham	Republican	For
13	Tuesday is ice cream day	Marco	Rubio	Republican	Against
14	Tuesday is ice cream day	Matt	Salmon	Republican	Against
15	Tuesday is ice cream day	Barbara	Boxer	Democrat	For
16	Tuesday is ice cream day	Dianne	Feinstein	Democrat	For
17	Tuesday is ice cream day	Kirsten	Gillibrand	Democrat	For

## **View:** BillVoteByParty

## **Create Statement:**

	billtitle text	partyaffiliation text	votevalue votevalues	count bigint
1	Freedom to Trump	Democrat	Against	1
2	Freedom to Trump	Other	For	1
3	Right to Arm Bears	Democrat	For	3
4	Right to Arm Bears	Democrat	Against	1
5	Right to Arm Bears	Republican	For	5
6	Tuesday is ice cream day	Democrat	For	3
7	Tuesday is ice cream day	Republican	For	1
8	Tuesday is ice cream day	Republican	Against	2

## **View:** PartyAffiliationByAvgAge

## **Create Statement:**

```
CREATE OR REPLACE VIEW PartyAffiliationByAvgAge
AS
SELECT PartyAffiliation, avg(date_part('year',age(DateOfBirth)))
FROM ElectedOfficials
GROUP BY PartyAffiliation;
```

	partyaffiliation text	avg double precision
1	Democrat	68.5
2	Republican	53.333333333333
3	Other	285.5

## Security

**Roles**: ADMIN, generalUser

Create two different roles and define privileges accordingly.

```
CREATE ROLE ADMIN:
GRANT SELECT, UPDATE, INSERT, DELETE
ON ALL TABLES IN SCHEMA Public
TO ADMIN;
CREATE ROLE generalUser;
GRANT SELECT
ON TABLE Bills.
ElectedOfficials,
Committees,
SenatorsByNameAndState,
RepresentativesByNameAndState,
CommitteeMembershipByTitleAndMemberName,
ElectedOfficialVoteByBill,
BillVoteByParty,
PartyAffiliationByAvaAge
TO generalUser;
```

## **Implementation Notes**

When this application is deployed on the web the database interfacing software will access the information in the tables using the general user role. The interfacing software will use database specific values such as ElectedOfficial\_id, Position\_id, Bill\_id, and Committee\_id to maintain the information's integrity; however, those values will not be visualized on the web as they their meaning is specific to the context to the database.

#### **Known Problems**

In the current state of the project a known problem is that there is not currently a limit on the number of Senators that can represent a state. Each state is only allowed two Senators to represent it in the Senate. Also another known problem is that an elected official appear in both the Senate and Representatives tables. Membership needs to each table should be exclusive preventing an elected official to appear in both tables at the same time. Another known problem is that Committee Membership should be exclusive based on the type of Committee. Senate Committees should only allow membership to elected officials in the Senate table, House Committees should only allow membership to elected officials in the Representatives table. These are design flaws and will be corrected in future iterations of the project design.

#### **Future Enhancements**

Enhancements this project to be implemented in the future include:

- When a bill receives a majority vote in the Votes table it's status should change to 'passed in congress' and should be added to another table for review by Executive and Legislative branch.
- Create another table for the Executive branch to include the President, Vice President.
- Allow President to review bills passed in congress and allow the president to veto a bill or approve it. The status of the bill would be changed to reflect the president's decision and could be added to a new table holding laws.
- Create another table for the Legislative branch, which would include the Supreme Court Justices.
- Allow Supreme Court Justices to review bills determine whether they are constitutional or must be altered. The status of the bill would be changed to reflect the decision.