

Pengantar Web Semantik



Konsep Web Semantik

Web Semantik

- The Semantic Web is not a separate Web but an **extension** of the current one, in which information is given well-defined **meaning**, better enabling computers and people to work in cooperation (Berners-Lee et al.)

Web Semantik

- Web semantik berfokus pada pemodelan informasi dengan menambahkan definisi **arti** yang dapat **dimengerti oleh komputer**
- Membangun suatu web semantik pada dasarnya merupakan proses untuk **mendefinisikan data** agar bisa bermakna dan bisa **dipahami oleh komputer**

Web Saat Ini

- Web saat ini hanya dapat dimengerti oleh manusia
- Umumnya digunakan untuk mengelola informasi, mencari, mem-*post*, menyebarkan informasi tentang orang atau produk dalam web

Web Saat Ini

- Hasil pencarian informasi bergantung *keyword*
- Konten tidak memiliki relasi keterhubungan logis
- Contoh: mencari tahu tentang seorang pegawai Vokasi UB yang bernama Suharto

suharto



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Suharto - Wikipedia

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Political party: Golkar **Nationality:** Indonesian

Cause of death: Congestive heart failure **Father:** Kertosudiro

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Soeharto - Wikipedia bahasa Indonesia, ensiklopedia bebas

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H. M. Soeharto, (Jawa Kuno: Suharta; Jawa Latin: Suhartā; Hanacaraka: ꦱꦸꦲꦂꦠ) (ER, EYD:

Suharto) (lahir di Kemusuk, Yogyakarta, 8 Juni 1921 – meninggal ...

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Suharto

Former President of Indonesia



Suharto was an Indonesian military leader and politician who served as the second President of Indonesia, holding the office for 31 years, from the ousting of Sukarno in 1967 until his resignation in 1998. He was widely regarded by foreign commentators as a dictator. [Wikipedia](#)

Born: June 8, 1921, [Kemusuk](#)

Died: January 27, 2008, [Jakarta](#)

Buried: [Astana Giribangun](#)

Spouse: [Siti Hartinah](#) (m. 1947–1996)

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Web Saat Ini

- Contoh: berita yang *misleading*





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- 3 Viral Kisah Horor "KKN di Desa Penari" Jadi Misteri
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- 6 Viral Gagal Rampas HP, Wajah Pelaku Langsung Beredar
- 7 Suami-Istri Bertengkar, 117 Kios di Sulbar Terbakar

Perkembangan Web

Web 1.0:

- Halaman web **statis**
- Konten dibuat oleh *webmaster*

Perkembangan Web

Web 2.0:

- Halaman web **dinamis**
- Konten dibuat oleh pengguna: blog, media sosial, dll. (ada interaksi)
- Komputer hanya menampilkan informasi (mudah)
- **Interpretasi** informasi dilakukan oleh pengguna sendiri (susah)

Perkembangan Web

Web 3.0:

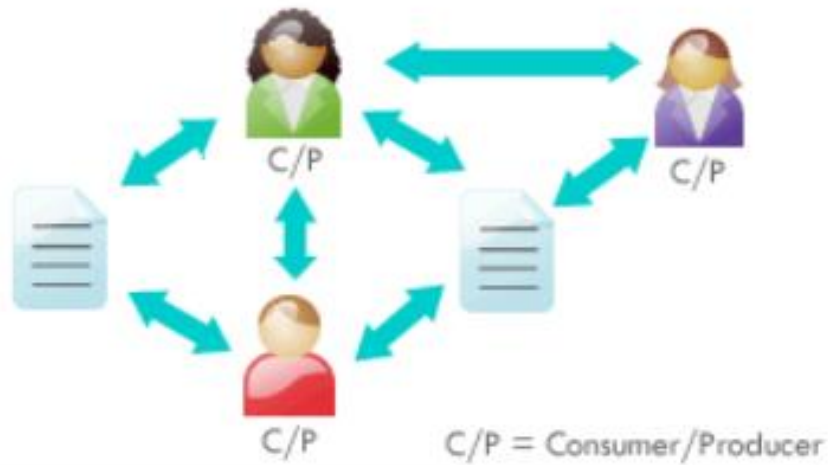
- Komputer dapat menginterpretasi informasi



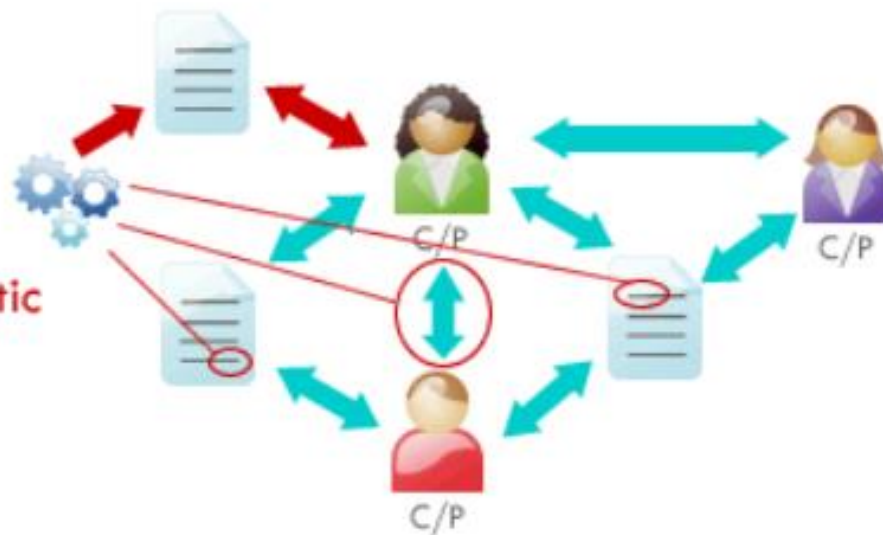
Web 1.0

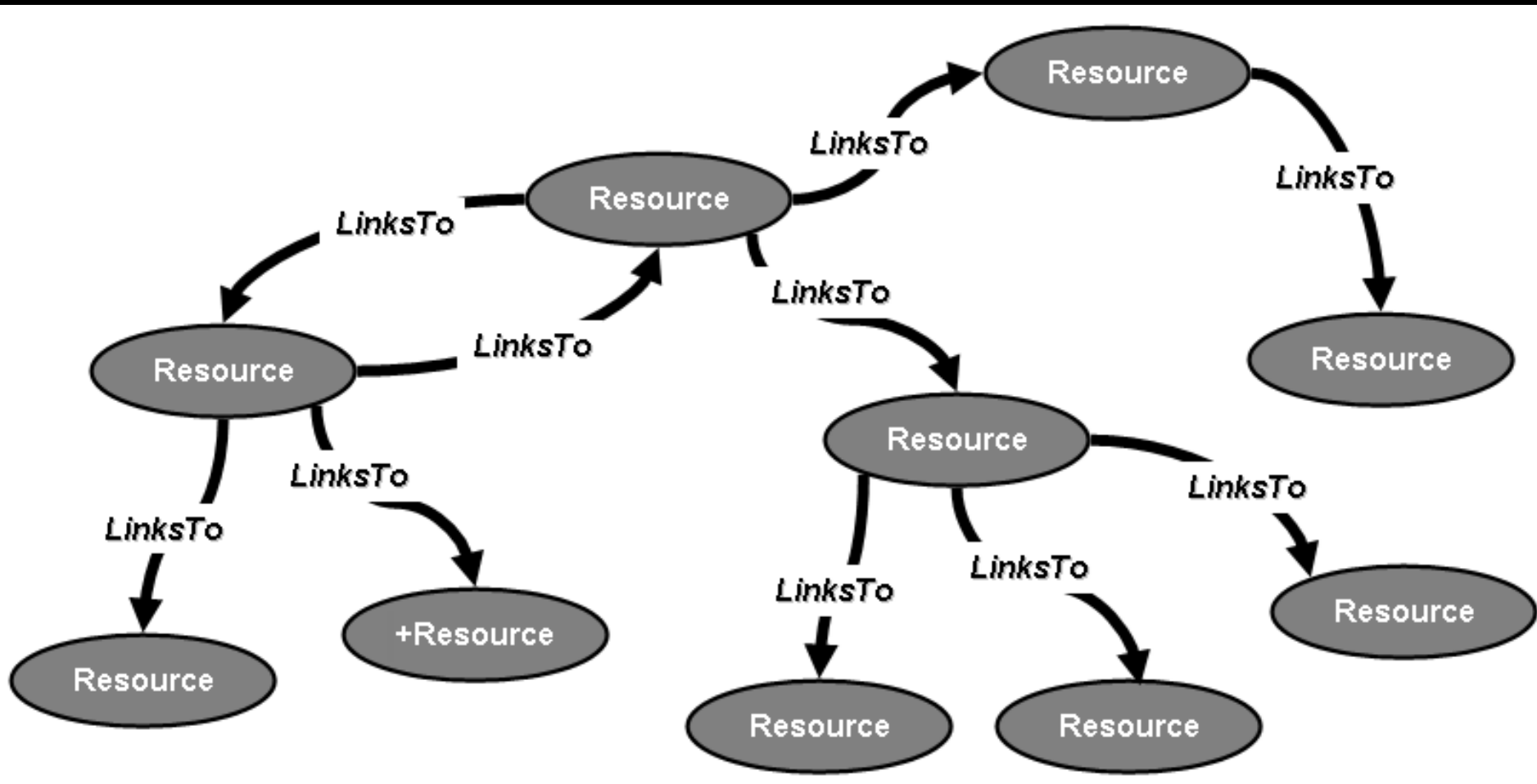


Web 2.0

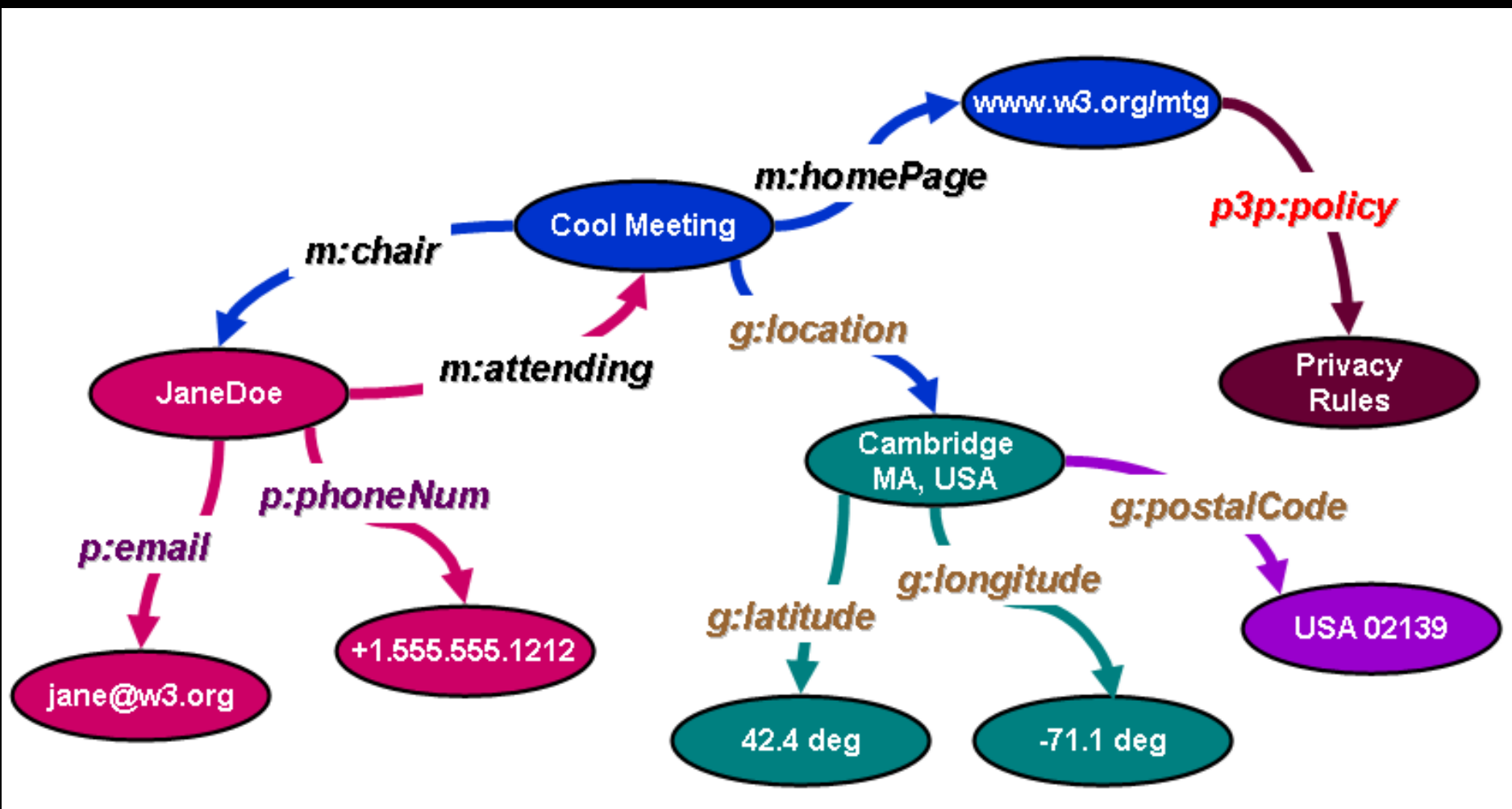


The
Semantic
Web





Web saat ini: “dumb links”



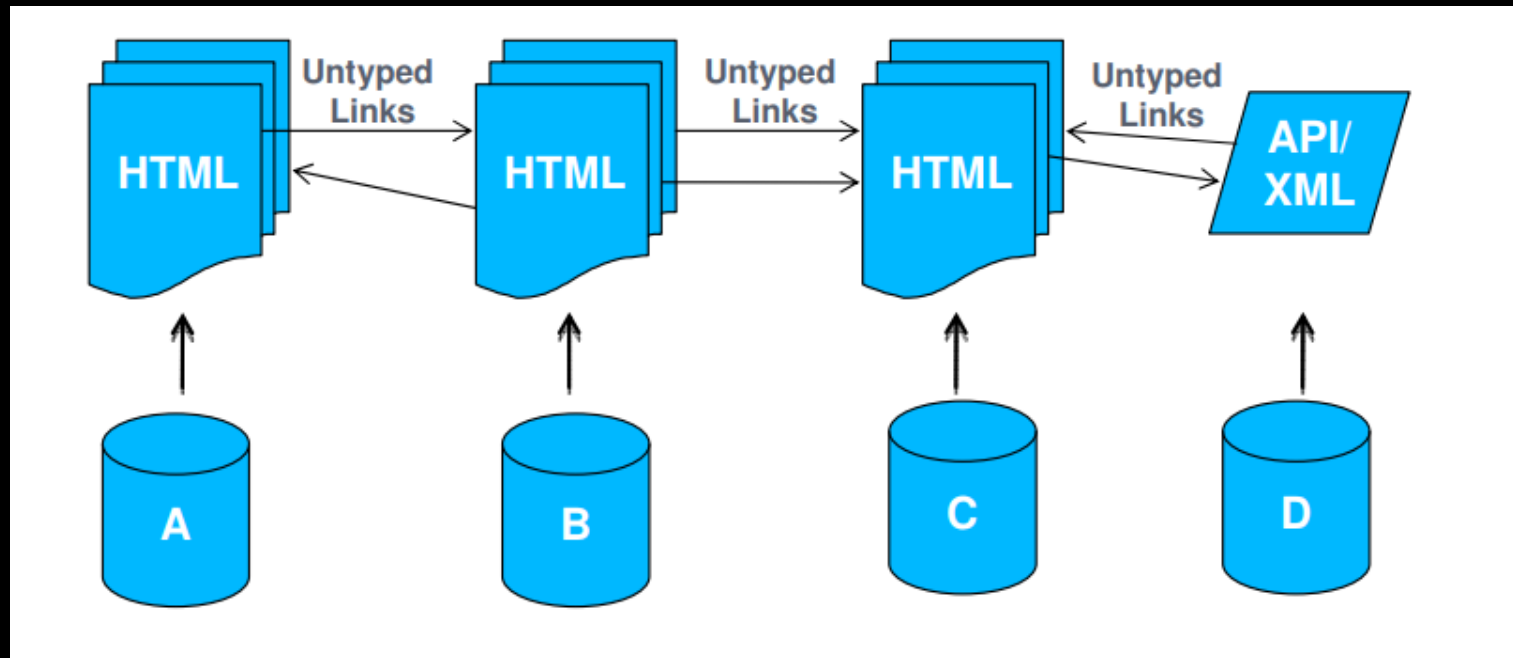
Web semantik: data terhubung dengan relasi

A row of approximately 20 dark wooden sticks or logs, arranged in a slightly curved line. The ends of the sticks are glowing with a warm, orange-yellow light, suggesting a fire or a digital signal. The background is a dark, gradient surface.

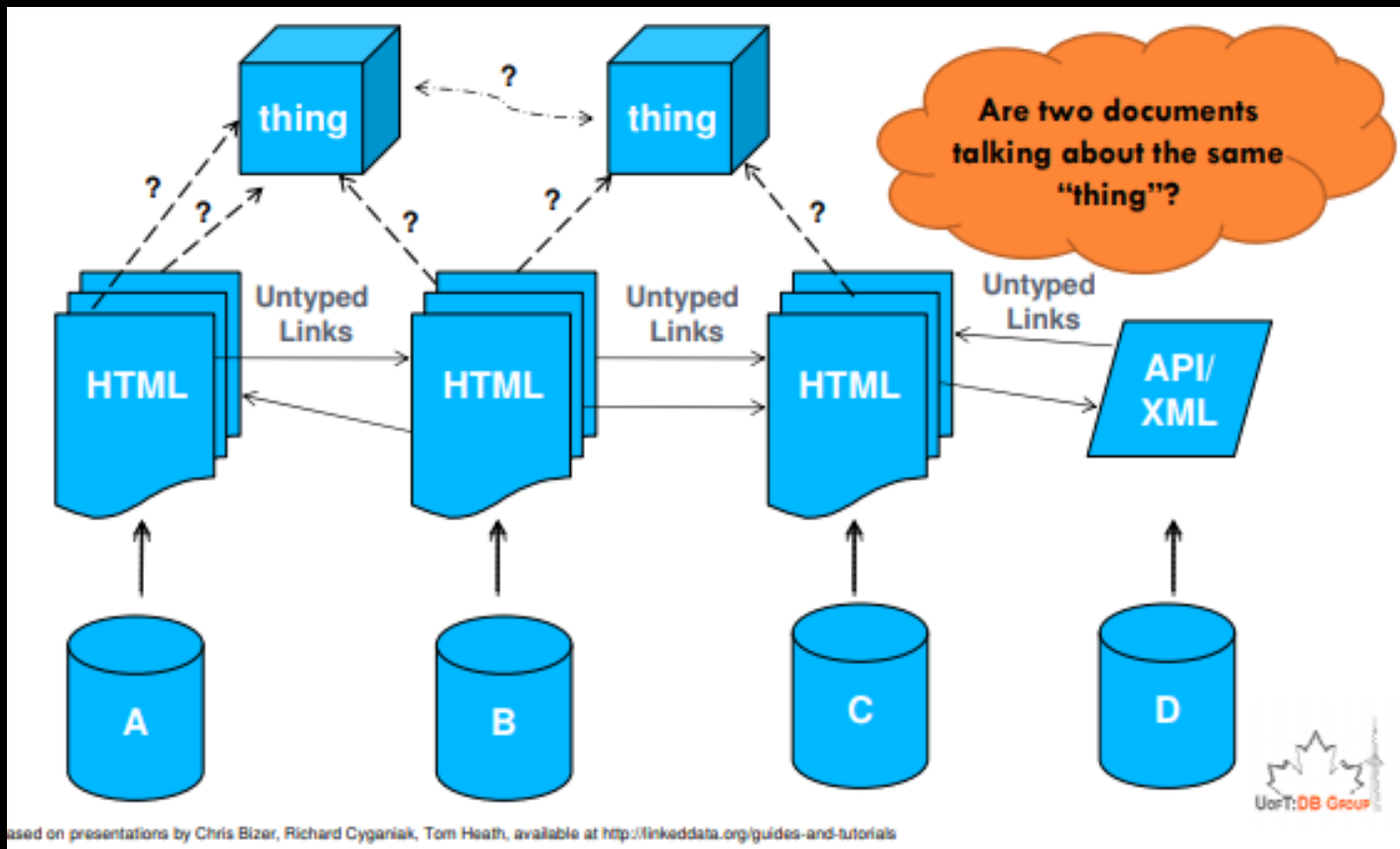
Web of Documents vs. Web of Data

Web of Documents

- Objek utama: **dokumen** (halaman)
- Menghubungkan dokumen-dokumen
- Tingkat **struktur** informasi pada data: rendah
- Semantik dari konten bersifat **implisit**, hanya dapat dipahami oleh pengguna
- Dirancang untuk konsumsi oleh pengguna (manusia)



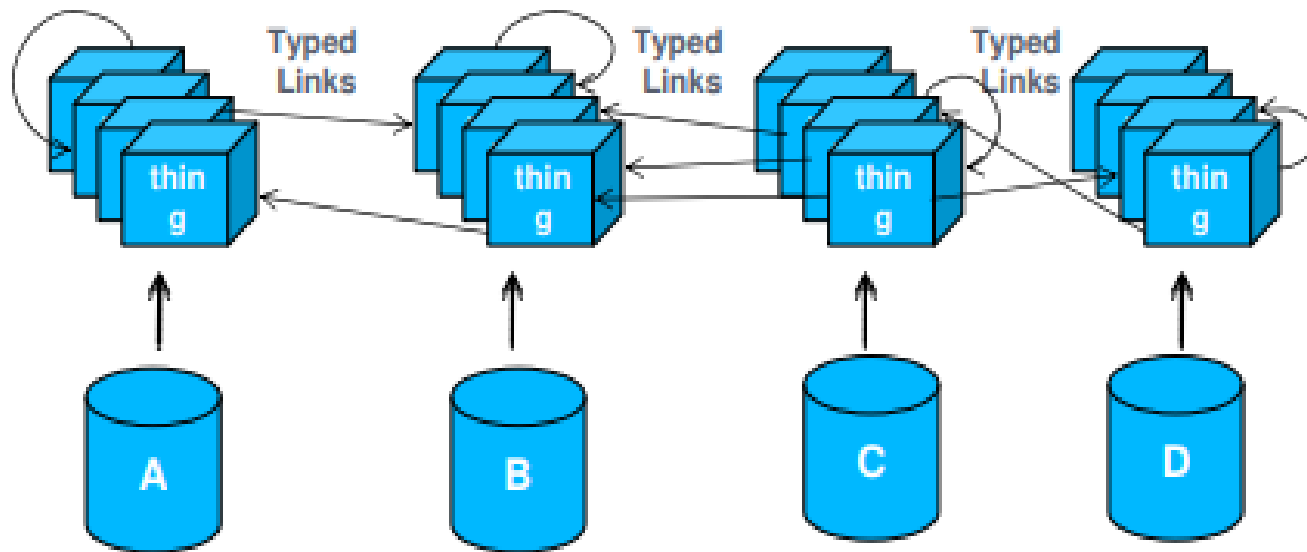
Web of Documents



Web of Documents

Web of Data

- Objek utama: **entitas/objek**
- Menghubungkan entitas-objek
- Tingkat **struktur** informasi pada data: tinggi
- Semantik dari konten bersifat **eksplisit**, dapat dipahami oleh pengguna dan komputer
- Dirancang untuk konsumsi oleh pengguna (manusia) dan mesin (komputer)



Web of Data



Data Relasional vs. Data Semantik

Tabular Data

| Restaurant | Address | Cuisine | Price | Open |
|-------------------|----------------|----------------|--------|-----------------------------------|
| Deli Llama | Peachtree Rd | Deli | \$ | Mon, Tue, Wed, Thu, Fri |
| Peking Inn | Lake St | Chinese | \$\$\$ | Thu, Fri, Sat |
| Thai Tanic | Branch Dr | Thai | \$\$ | Tue, Wed, Thu, Fri, Sat, Sun |
| Lord of the Fries | Flower Ave | Fast Food | \$\$ | Tue, Wed, Thu, Fri, Sat, Sun |
| Marquis de Salade | Main St | French | \$\$\$ | Thu, Fri, Sat |
| Wok This Way | Second St | Chinese | \$ | Mon, Tue, Wed, Thu, Fri, Sat, Sun |
| Luna Sea | Autumn Dr | Seafood | \$\$\$ | Tue, Thu, Fri, Sat |
| Pita Pan | Thunder Rd | Middle Eastern | \$\$ | Mon, Tue, Wed, Thu, Fri, Sat, Sun |
| Award Weiners | Dorfold Mews | Fast Food | \$ | Mon, Tue, Wed, Thu, Fri, Sat |
| Lettuce Eat | Rustic Parkway | Deli | \$\$ | Mon, Tue, Wed, Thu, Fri |

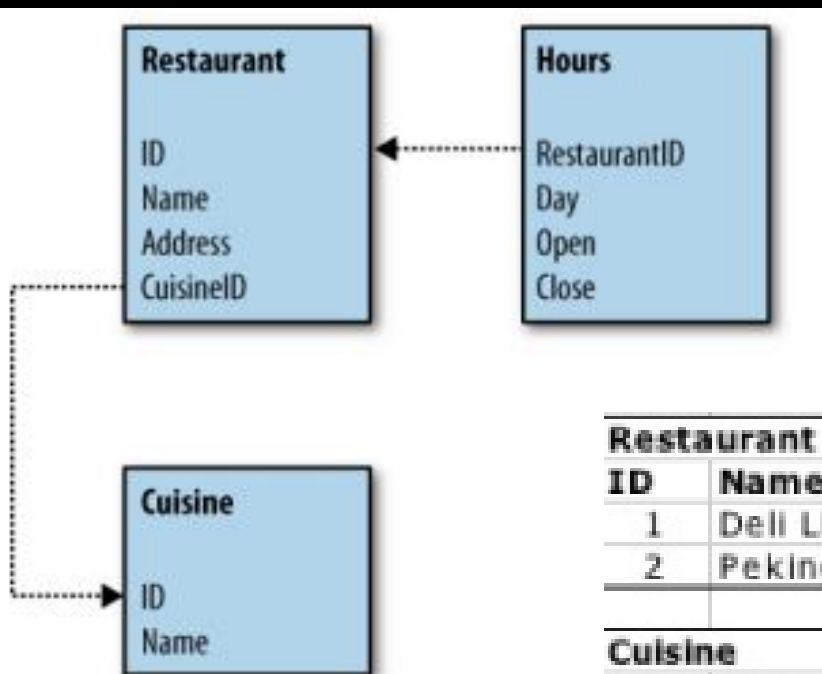
Restoran manakah yang buka pada malam hari?

Tabular Data

| Restaurant | Address | Cuisine | Price | Open |
|------------|--------------|---------|--------|--|
| Deli Llama | Peachtree Rd | Deli | \$ | Mon (11a–4p), Tue (11–4), Wed (11–4), Thu (11–7), Fri (11–8) |
| Peking Inn | Lake St | Chinese | \$\$\$ | Thu (5p–10p), Fri (5–11), Sat (5–11) |

- Sulit untuk melakukan *query*
- Struktur tidak fleksibel

Relational Data



| Restaurant | | | | | | |
|------------|------------|--------------|--------|-----------|------|-------|
| ID | Name | Address | Price | CuisineID | | |
| 1 | Deli Llama | Peachtree Rd | \$ | 1 | | |
| 2 | Peking Inn | Lake St | \$\$\$ | 2 | | |
| | | | | | | |
| Cuisine | | | Hours | | | |
| ID | Name | | RestID | Day | Open | Close |
| 1 | Deli | | 1 | Mon | 11 | 16 |
| 2 | Chinese | | 1 | Tue | 11 | 16 |
| 3 | Thai | | 1 | Wed | 11 | 16 |
| 4 | Fast Food | | 1 | Thu | 11 | 19 |
| | | | 1 | Fri | 11 | 20 |
| | | | 2 | Thu | 5 | 22 |
| | | | 2 | Fri | 5 | 23 |
| | | | 2 | Sat | 5 | 23 |

Relational Data

Restoran manakah yang buka pada malam hari?

```
SELECT Restaurant.Name, Cuisine.Name, Hours.Open, Hours.Close
FROM Restaurant, Cuisine, Hours
WHERE Restaurant.CuisineID=Cuisine.ID
AND Restaurant.ID=Hours.RestaurantID
AND Hours.Day="Fri"
AND Hours.Open<22
AND Hours.Close>22
```

- Dapat dilakukan *query* dengan hasil:

| Restaurant.Name | Cuisine.Name | Hours.Open | Hours.Close |
|-----------------|--------------|------------|-------------|
| Peking Inn | Chinese | 17 | 23 |

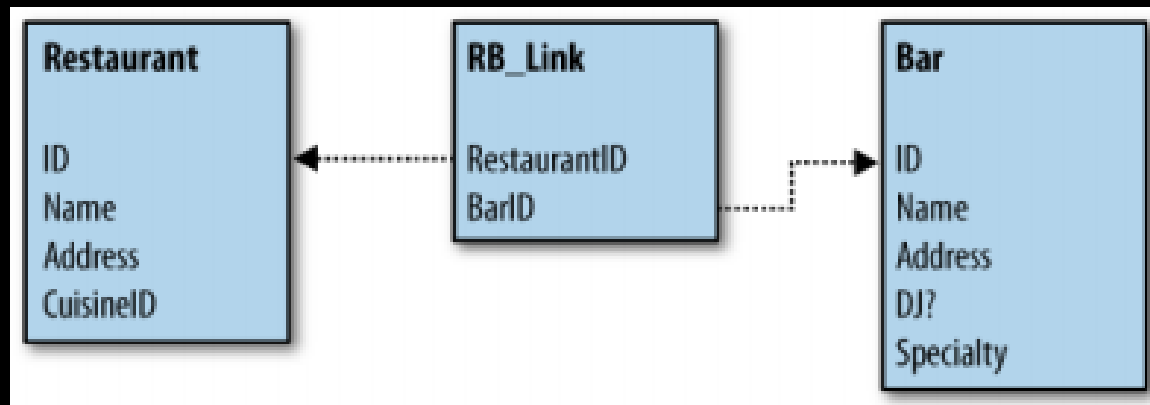
Relational Data

Data berevolusi: restoran dapat memiliki bar

| Bar | Address | DJ | Specialty drink |
|-------------------|------------|-----|-----------------|
| The Bitter End | 14th Ave | No | Beer |
| Peking Inn | Lake St | No | Scorpion Bowl |
| Hammer Time | Wildcat Dr | Yes | Hennessey |
| Marquis de Salade | Main St | Yes | Martini |

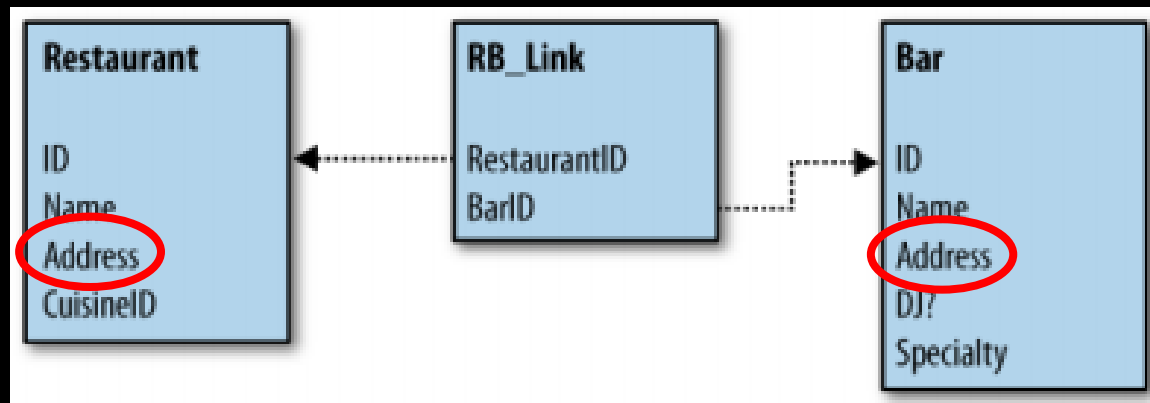
Relational Data

Restoran dan bar memiliki relasi *many to many*.



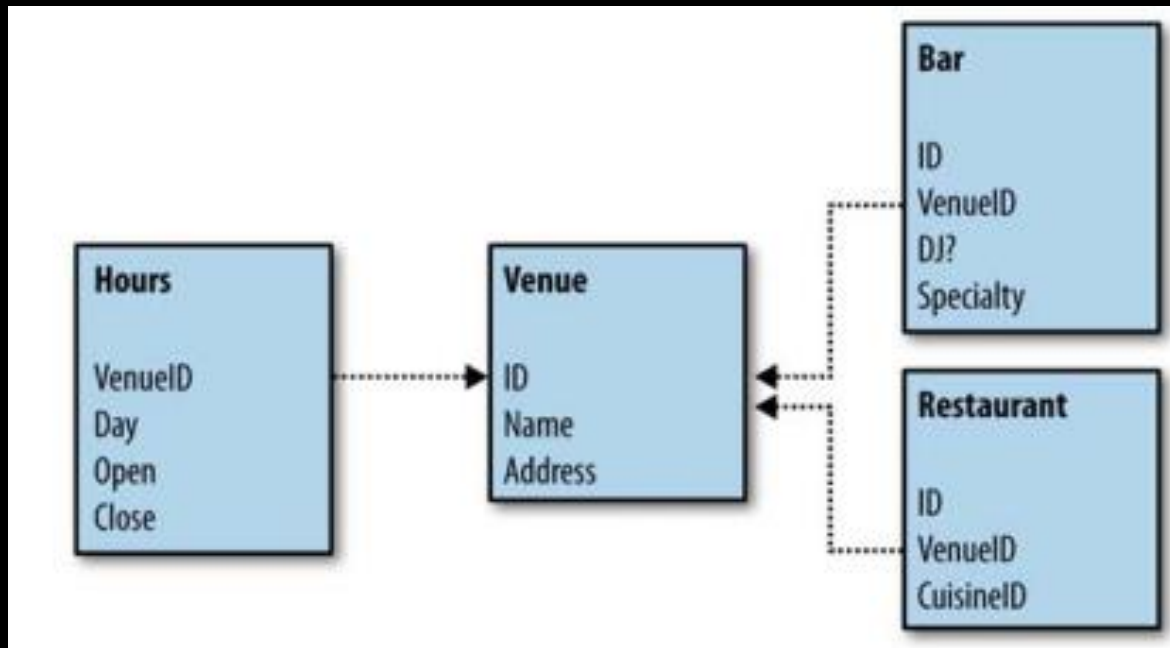
Relational Data

Ada informasi yang duplikat:



Relational Data

Solusi: menambahkan tabel Venue:

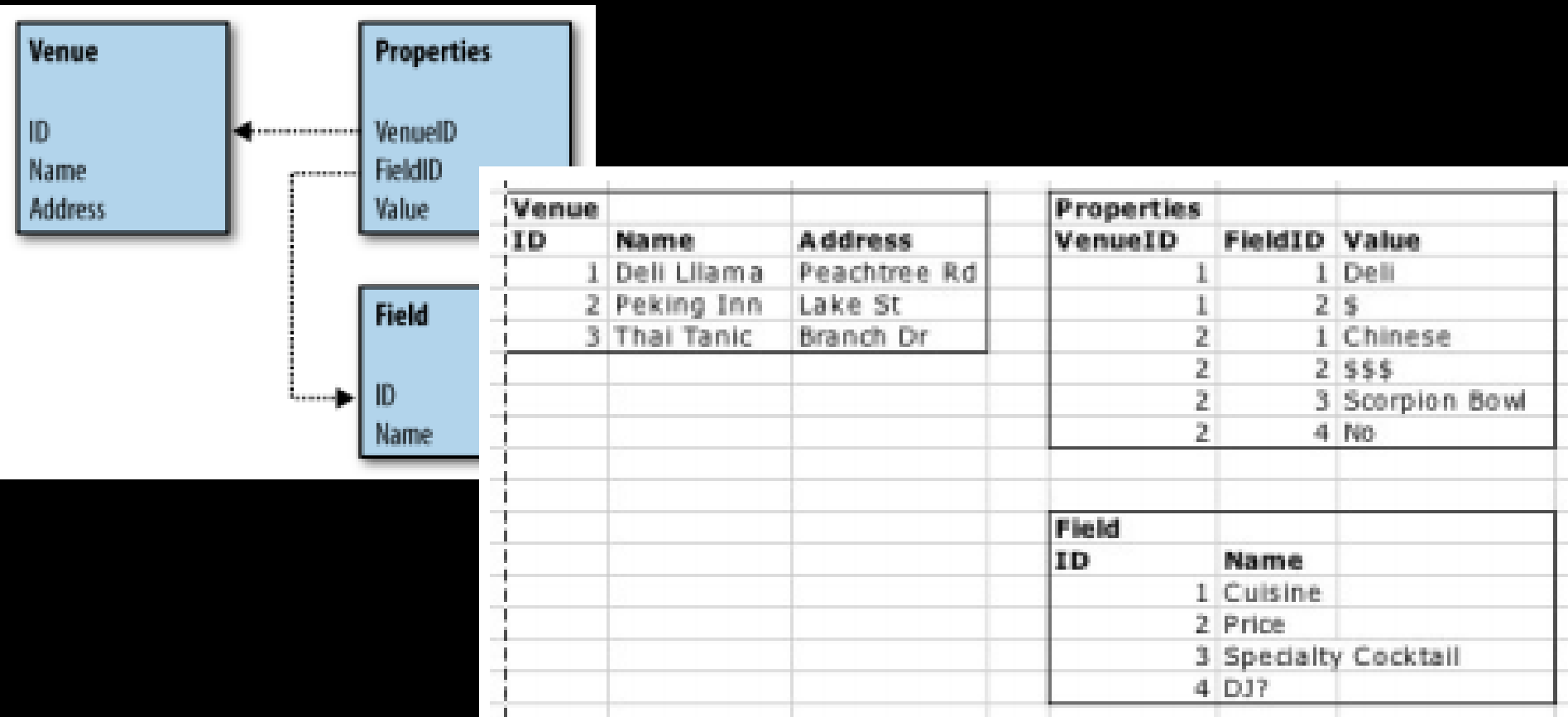




**Semakin lama,
struktur tabel
akan menjadi
semakin kompleks**

Semantic Data

Solusi: membuat struktur lebih sederhana:



Semantic Data

Lebih sederhana lagi:

| Properties | | | Field | |
|------------|---------|---------------|-------|--------------------|
| VenueID | FieldID | Value | ID | Name |
| 1 | 1 | Dell | 1 | Cuisine |
| 1 | 2 | \$ | 2 | Price |
| 1 | 7 | Dell Llama | 3 | Specialty Cocktail |
| 1 | 8 | Peachtree Rd | 4 | DJ? |
| 2 | 1 | Chinese | 5 | Live Music |
| 2 | 2 | \$\$\$ | 6 | Music Genre |
| 2 | 3 | Scorpion Bowl | 7 | Name |
| 2 | 4 | No | 8 | Address |
| 2 | 7 | Peking Inn | | |
| 2 | 8 | Lake St | | |
| 3 | 5 | Yes | | |
| 3 | 6 | Jazz | | |
| 3 | 7 | Thai Tonic | | |
| 3 | 8 | Branch Dr | | |

Semantic Data

Paling sederhana:

| VenueID | Field | Value |
|---------|--------------------|---------------|
| 1 | Cuisine | Deli |
| 1 | Price | \$ |
| 1 | Name | Deli Llama |
| 1 | Address | Peachtree Rd |
| 2 | Cuisine | Chinese |
| 2 | Price | \$\$\$ |
| 2 | Specialty Cocktail | Scorpion Bowl |
| 2 | DJ? | No |
| 2 | Name | Peking Inn |
| 2 | Address | Lake St |
| 3 | Live Music? | Yes |
| 3 | Music Genre | Jazz |
| 3 | Name | Thai Tonic |
| 3 | Address | Branch Dr |

Semantic Data

- Pada web semantik, semua data direpresentasikan dalam format *triple* (subjek-predikat-objek)
- Format triple tersebut memiliki **fleksibilitas** yang tinggi yang dapat beradaptasi terhadap perubahan data

Tugas

- Buat sebuah database relasional lalu ubah ke format triple!



Table 3.1 Tabular Data about Elizabethan Literature and Music

| ID | Title | Author | Medium | Year |
|----|-----------------------------|---------------------|--------|------|
| 1 | <i>As You Like It</i> | Shakespeare | Play | 1599 |
| 2 | <i>Hamlet</i> | Shakespeare | Play | 1604 |
| 3 | <i>Othello</i> | Shakespeare | Play | 1603 |
| 4 | "Sonnet 78" | Shakespeare | Poem | 1609 |
| 5 | <i>Astrophil and Stella</i> | Sir Phillip Sidney | Poem | 1590 |
| 6 | <i>Edward II</i> | Christopher Marlowe | Play | 1592 |
| 7 | <i>Hero and Leander</i> | Christopher Marlowe | Poem | 1593 |
| 8 | <i>Greensleeves</i> | Henry VIII Rex | Song | 1525 |

Table 3.4 Triples about Shakespeare's Plays

| Subject | Predicate | Object |
|-------------|-----------|-----------------------------|
| Shakespeare | Wrote | <i>As You Like It</i> |
| Shakespeare | Wrote | <i>Henry V</i> |
| Shakespeare | Wrote | <i>Love's Labour's Lost</i> |
| Shakespeare | Wrote | <i>Measure for Measure</i> |
| Shakespeare | Wrote | <i>Twelfth Night</i> |
| Shakespeare | Wrote | <i>The Winter's Tale</i> |
| Shakespeare | Wrote | <i>Hamlet</i> |
| Shakespeare | Wrote | <i>Othello</i> |
| | | etc. |