

# Frequency Business Rules in ORM

(Chapter 6)

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Some diagrams in this lecture are based on [1]

**Keywords:** Frequency constraints, Cardinality, multiplicity, Rules, Business Rules, Business logic derivation rules, integrity constraints

# Conceptual Schema Design Steps

1. From examples to elementary facts



2. Draw fact types and apply population check



3. Combine entity types



4. Add uniqueness constraints



5. Add mandatory constraints



6. Add subtype relations and other constraints



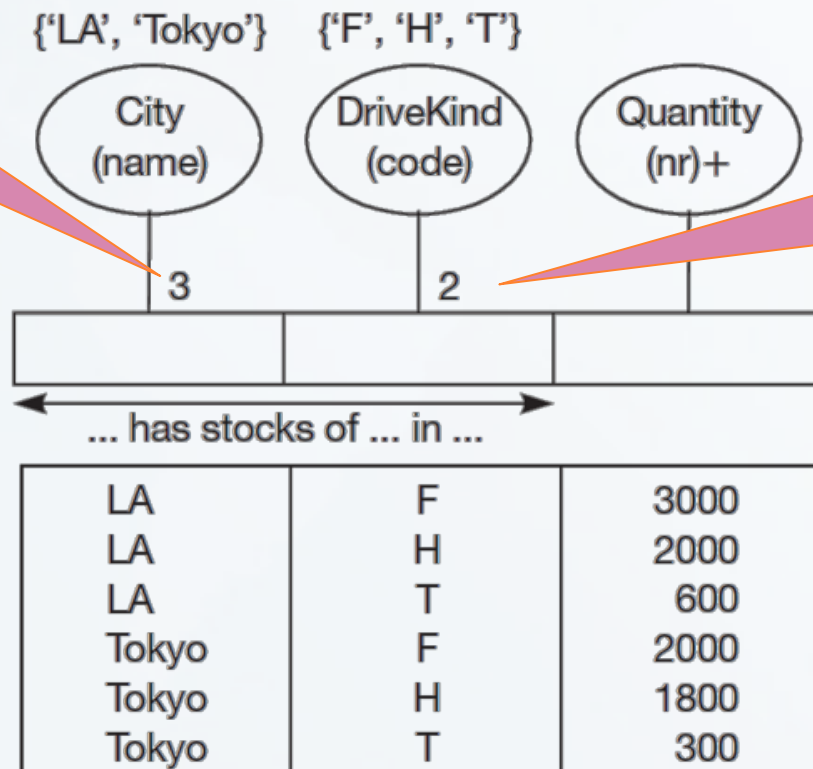
7. Final checks, & schema engineering issues



# Frequency constraints

To indicate that each entry in a fact column must occur there exactly  $n$  times, the number  $n$  is written beside the role.

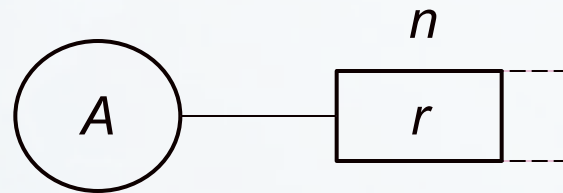
Each city in the first column must occur three times.



each drive kind in the Second column must appear there twice

A compound transaction is needed to initially populate this fact type requiring at least six facts to be added.

# Frequency constraints



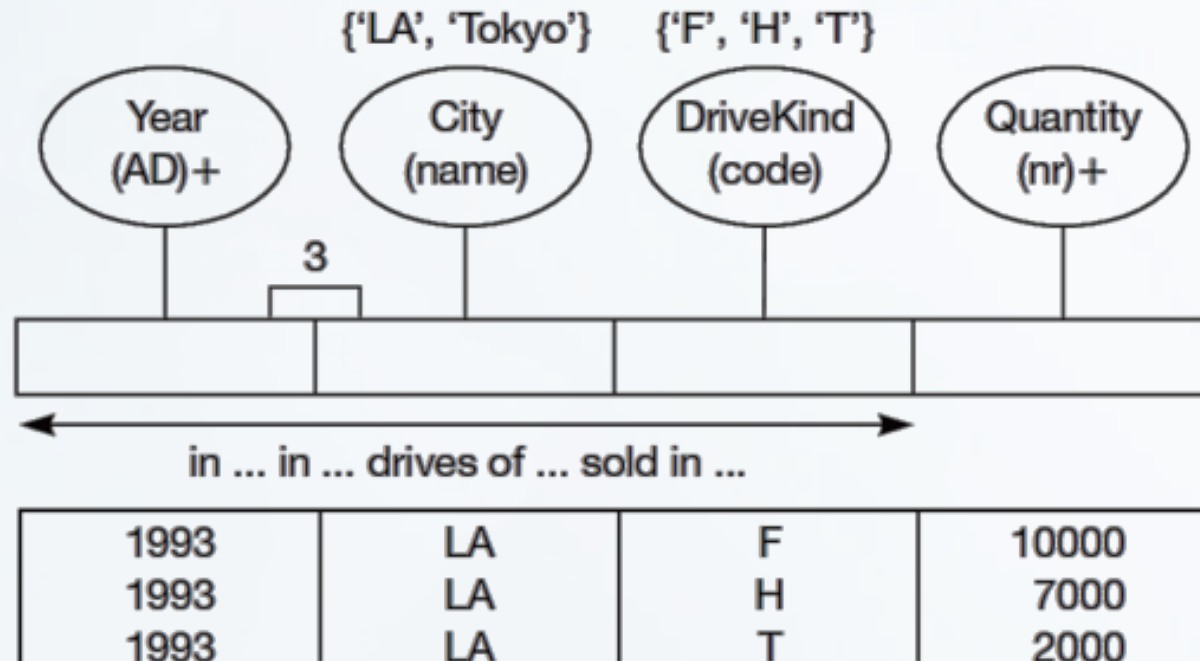
Each member of  $\text{pop}(r)$  occurs there exactly  $n$  times.

*$n$  must be a positive integer.*



If  $n = 1$ , this is equivalent to a uniqueness constraint

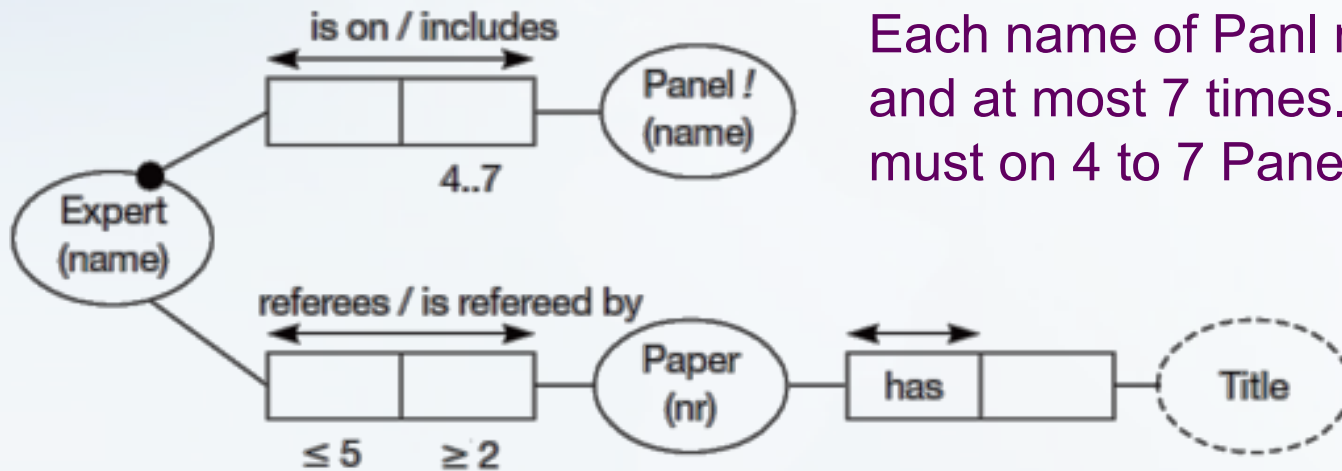
# Compound Frequency Constraint



The values of (Year and City) must occur exactly three times

# Ranged Frequency Constraint

Examples of minimum and maximum frequency constraints.



Each name of Panel must occur at least 4 and at most 7 times. That is, each Expert must on 4 to 7 Panels

Each Expert can referee 5 papers

Each Paper can be refereed by at least two Experts.

# References

- [1] Terry Halpin, Tony Morgan: Information Modeling and Relational Databases, Second Edition. Second Edition. The Morgan Kaufmann Series in Data Management Systems. ISBN: 0123735688
- [2] Mustafa Jarrar and Robert Meersman: Ontology Engineering -The DOGMA Approach. Book Chapter in "Advances in Web Semantics I". Chapter 3. Pages 7-34. LNCS 4891, Springer.ISBN:978-3540897835. (2008).
- [3] Mustafa Jarrar, Anton Deik, Bilal Faraj: Ontology-Based Data And Process Governance Framework -The Case Of E-Government Interoperability In Palestine . In pre-proceedings of the IFIP International Symposium on Data-Driven Process Discovery and Analysis (SIMPDA'11). Pages(83-98). ISBN 978-88-903120-2-1. Campione, Italy. June 30, 2011.
- [4] Mustafa Jarrar: Mapping ORM Into The SHOIN/OWL Description Logic- Towards A Methodological And Expressive Graphical Notation For Ontology Engineering . In OTM 2007 workshops: Proceedings of the International Workshop on Object-Role Modeling (ORM'07). Pages (729-741), LNCS 4805, Springer. ISBN: 9783540768890. Portugal. November, 2007
- [5] Mustafa Jarrar: Towards Automated Reasoning On ORM Schemes. -Mapping ORM Into The DLR\_idf Description Logic. In proceedings of the 26th International Conference on Conceptual Modeling (ER 2007). Pages (181-197). LNCS 4801, Springer. Auckland, New Zealand. ISBN 9783540755623. November 2007
- [6] Mustafa Jarrar and Stijn Heymans: Unsatisfiability Reasoning In ORM Conceptual Schemes. In Current Trends in Database Technology - EDBT 2006: Proceeding of the IFIP-2.6 International Conference on Semantics of a Networked. Pages (517-534). LNCS 4254, Springer. Munich, Germany. ISBN: 3540467882. March 2006.
- [7] Mustafa Jarrar and Stijn Heymans: [Towards Pattern-Based Reasoning For Friendly Ontology Debugging](#) . Journal of Artificial Intelligence Tools. Volume 17. No.4. World Scientific Publishing. August 2008.
- [8] Mustafa Jarrar, Maria Keet, and Paolo Dongilli: Multilingual Verbalization Of ORM Conceptual Models And Axiomatized Ontologies. Technical report. STARLab, Vrije Universiteit Brussel, February 2006.
- [9] Sergey Lukichev and Mustafa Jarrar: Graphical Notations For Rule Modeling . Book chapter in "Handbook of Research on Emerging Rule-Based Languages and Technologies". IGI Global. ISBN:1-60566-402-2. (2009)
- [10] Mustafa Jarrar: Modularization And Automatic Composition Of Object-Role Modeling (ORM) Schemes .OTM 2005 Workshops: Proceedings of the Object-Role Modeling (ORM'05). Pages (613-625). LNCS 3762, Springer. ISBN: 3540297391. 2005.
- [11] Mustafa Jarrar: Towards Methodological Principles For Ontology Engineering. PhD Thesis. Vrije Universiteit Brussel. (May 2005)
- [12] Mustafa Jarrar, Jan Demey, and Robert Meersman: On Using Conceptual Data Modeling For Ontology Engineering . Journal on Data Semantics, Special issue on "Best papers from the ER/ODBASE/COOPIS 2002 Conferences". LNCS 2800. No 1. Springer. 2003.
- [13] Jan Demey, Mustafa Jarrar, and Robert Meersman: A Markup Language For ORM Business Rules . Proceedings of the International Workshop on Rule Markup Languages for Business Rules on the Semantic Web (RuleML 2002). Pages(107-128). Volume 60. CEUR Workshop Proceedings. ISSN 1613-0073. June 2002
- [14] Mustafa Jarrar: Towards Effectiveness And Transparency In E-Business Transactions, An Ontology For Customer Complaint Management . A book chapter in "Semantic Web Methodologies for E-Business Applications". chapter 7. IGI Global. (2008)
- [15] Mustafa Jarrar: ORM Markup Language, Version 3 . Technical Report. STAR Lab, Vrije Universiteit Brussel, Belgium. January 2007