# Aplicação de Métricas para Quantificação de Acoplamento de Código

**Disciplina:** IN0980 - Tópicos Avançados em Engenharia de Software 3
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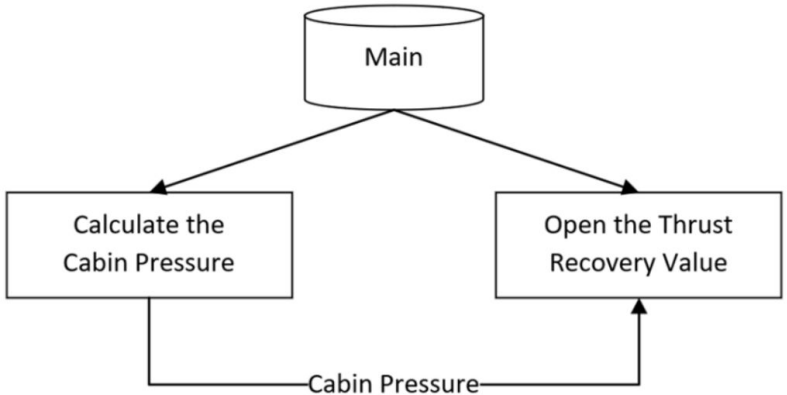
# Acoplamento

- Representa o grau da relação entre as entidades de um sistema (Zhao, 2011).
- Manutenabilidade;
- Testabilidade;
- Compreensibilidade.

# Acoplamento

- Acoplamento de Dado x Acoplamento de Controle




Fonte: Dou, et all (2023)

2011 Eighth International Conference on Fuzzy Systems and Knowledge Discovery (FSKD)

# Quantitative Analysis of System Coupling

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***Abstract*—To solve the problem that it is difficult to calculate system coupling in the field of systems science and software engineering, this article discussed quantitative analysis of system coupling. It is difficult to calculate system coupling in the field of system science and software engineering. Consequently, this paper discussed quantitative analysis of system coupling to solve this problem. According to the dependencies between the entities in a system, this paper proposed two mathematical models to measure system coupling based on entropy and judgment matrix. With these two models, it is possible to measure the coupling of each entity in the system and provide a basis for reducing the system coupling. Finally, this paper verified the validity and utility of the proposed models via a case of data warehouse structure.**

***Keywords- information entropy; judgment matrix; coupling; quantitative***

- Maintainability: One entity's modification may cause other entities which are related to it need to be modified too.
- Testability: One entity's errors may cause other entities' errors which are related to it.
- Comprehensibility: To understand a certain entity must understand other entities which are related to it.

Therefore, the design principle of software system is usually to reduce the system coupling.

## II. THE METHODOLOGY

In software engineering, the quantification of important qualitative analysis has been the focus of attention, including a representative KobrA KobrA made recommendations and

# Quantitative Analysis of System Coupling

- O acoplamento de sistema é dado por:

$$H_C = -\sum_{i=1}^{N} \frac{n_i p_i}{2M} \log \frac{n_i}{2M}$$

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# A Coupling Analysis Method for Airborne Software Based on Requirement Model

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***Abstract*—In order to measure the data coupling and control coupling between system components and to clarify the dependency relationships among variables in the requirements, this study offers an airborne software requirements coupling analysis approach based on the requirement model. A data coupling and control coupling analysis method based on the**

other two components, 'Calculate the Cabin Pressure' and 'Open the Thrust Recovery Valve' [5]. The global variable 'Cabin Pressure' is used to pass the calculated cabin pressure between the two components. In this example, control coupling exists between the 'Main Controller' and the 'Calculate Cabin Pressure' components, as well as between the 'Main Controller'

# Quantitative Analysis of System Coupling

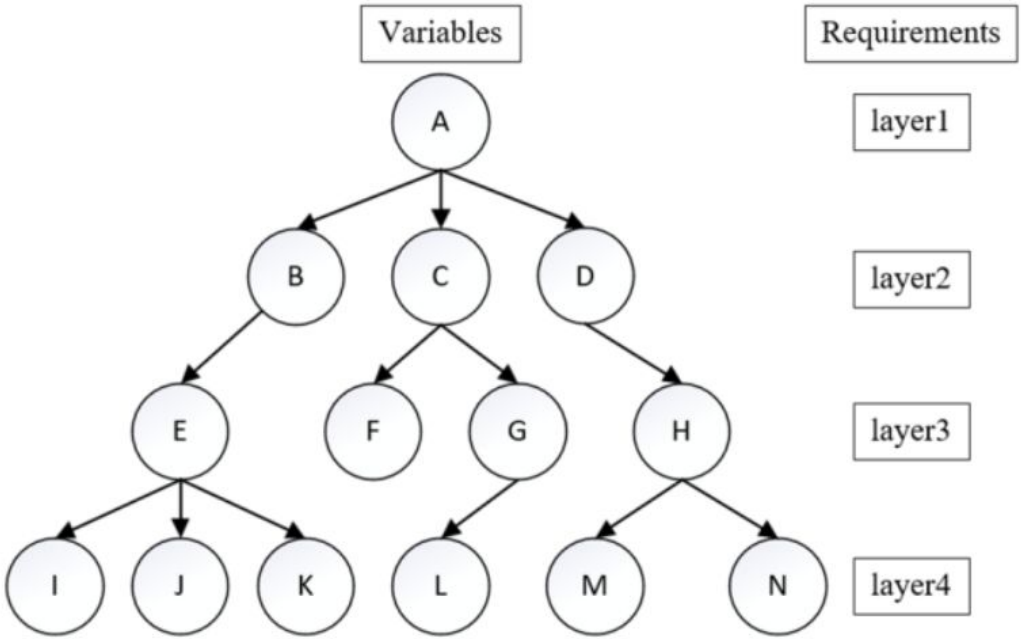


Figure 2. diagram of requirement variable dependency tree

# Quantitative Analysis of System Coupling

- Manual Coefficient:
  - Importância de uma variável
    - Alavanca de controle x Temperatura da cabine

# Quantitative Analysis of System Coupling

- Standard Coefficient:
  - Pondera a quantidade de vezes que uma variável foi usada

$$SC = \sqrt{X_i \div \sqrt{\frac{\sum_{i=1}^{n}(X_i - \mu)^2}{N}}}.$$

$X_i$ -> Quantidade de vezes que a variável i foi utilizada,
u -> Média de ocorrência de todas as variáveis
N -> Total de variáveis

# Quantitative Analysis of System Coupling

- Hierarchical Coefficient:
  - Verifica a posição das variáveis na árvore de dependência.

$$HC = \left(dep(i) + cmp(i)\right) \times \frac{1}{2^{F(i)-1}}.$$

dep(i) -> Distância para um nó i
cmp(i) -> Complexidade para um nó i
F(i) -> Ordem do nó i

# Quantitative Analysis of System Coupling

- O acoplamento entre dois componentes consiste em uma soma cumulativa dos pesos de todas as variáveis envolvidas nos componentes.

# Quantitative Analysis of System Coupling

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# Código

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