

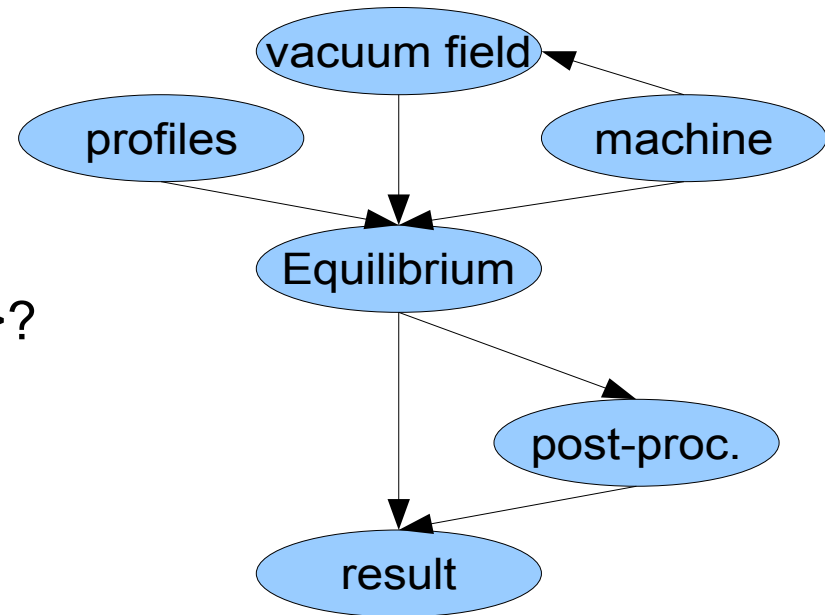
# **M**magnetic**C**onfiguration**D**ata**B**ase

- Purpose
- General scheme
- Implementation/Status
- Outlook

# Purpose

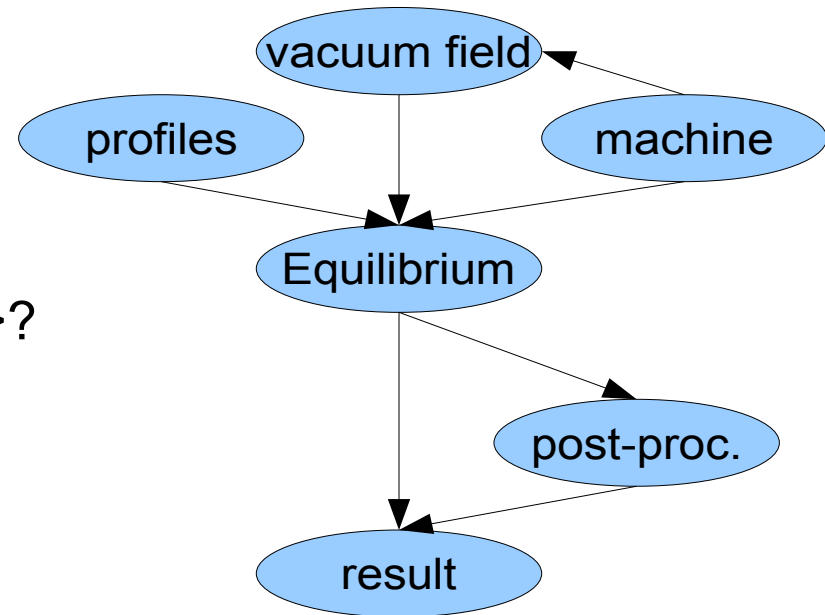
- Equilibrium information for:
  - Mapping of diagnostics
  - Transport-analysis
  - Modelling/Interpretation
  - ...
- 3D-eq.calc.s : min.s < CPU-time ~ hrs->?
  - Reuse calculated equilibria  
=> reliable data source
    - Storage/access
    - search/find
    - trace/reproduce

➤ Relational database scheme



# Purpose

- Equilibrium information for:
  - Mapping of diagnostics
  - Transport-analysis
  - Modelling/Interpretation
  - ...
- 3D-eq.calc.s : min.s < CPU-time ~ hrs->?
  - Reuse calculated equilibria  
=> reliable data source
    - Storage/access
    - search/find
    - trace/reproduce



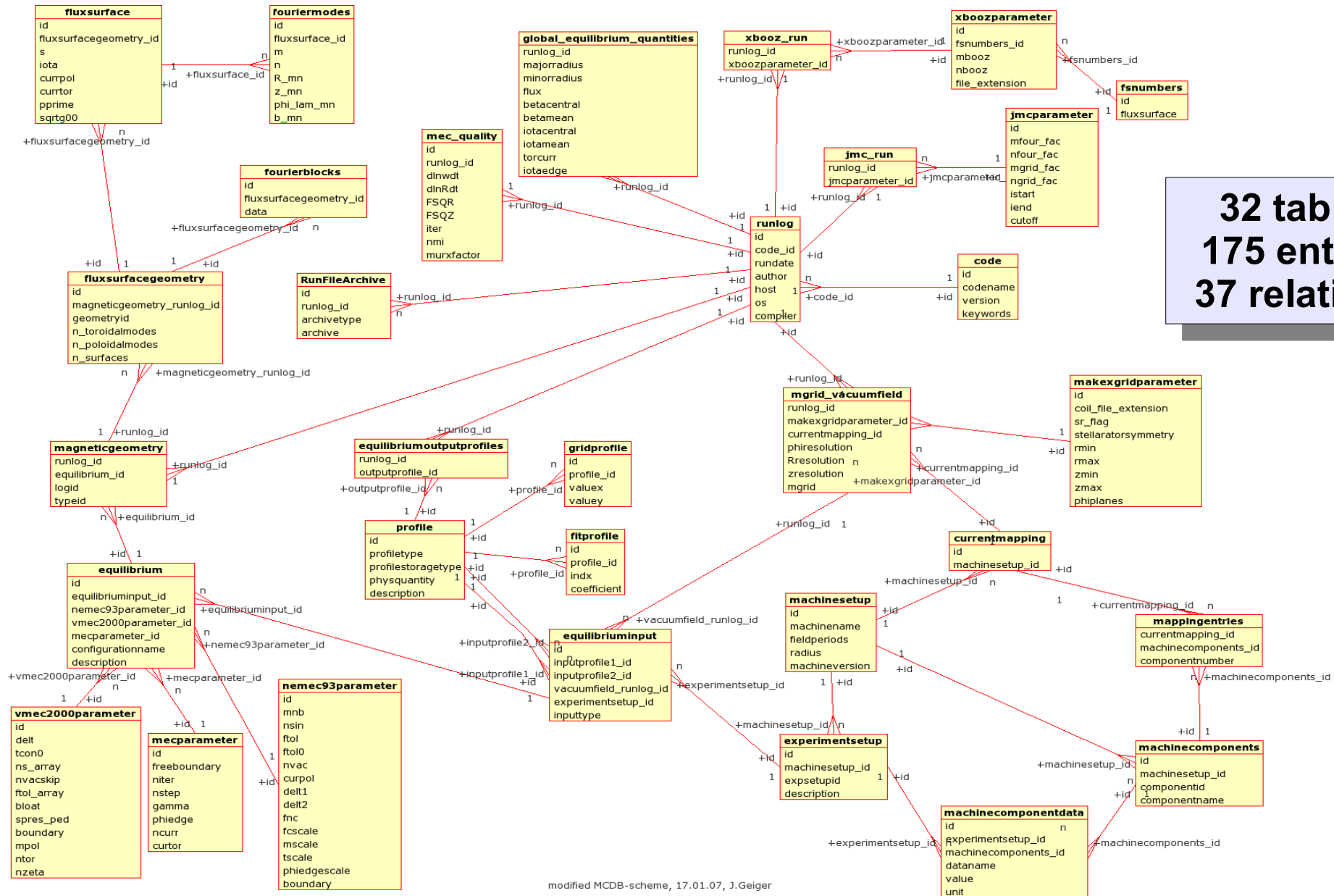
➤ Relational database scheme

➤ Gain experience in design and usage of databases ( XDV-concept for W7-X)

# Database scheme

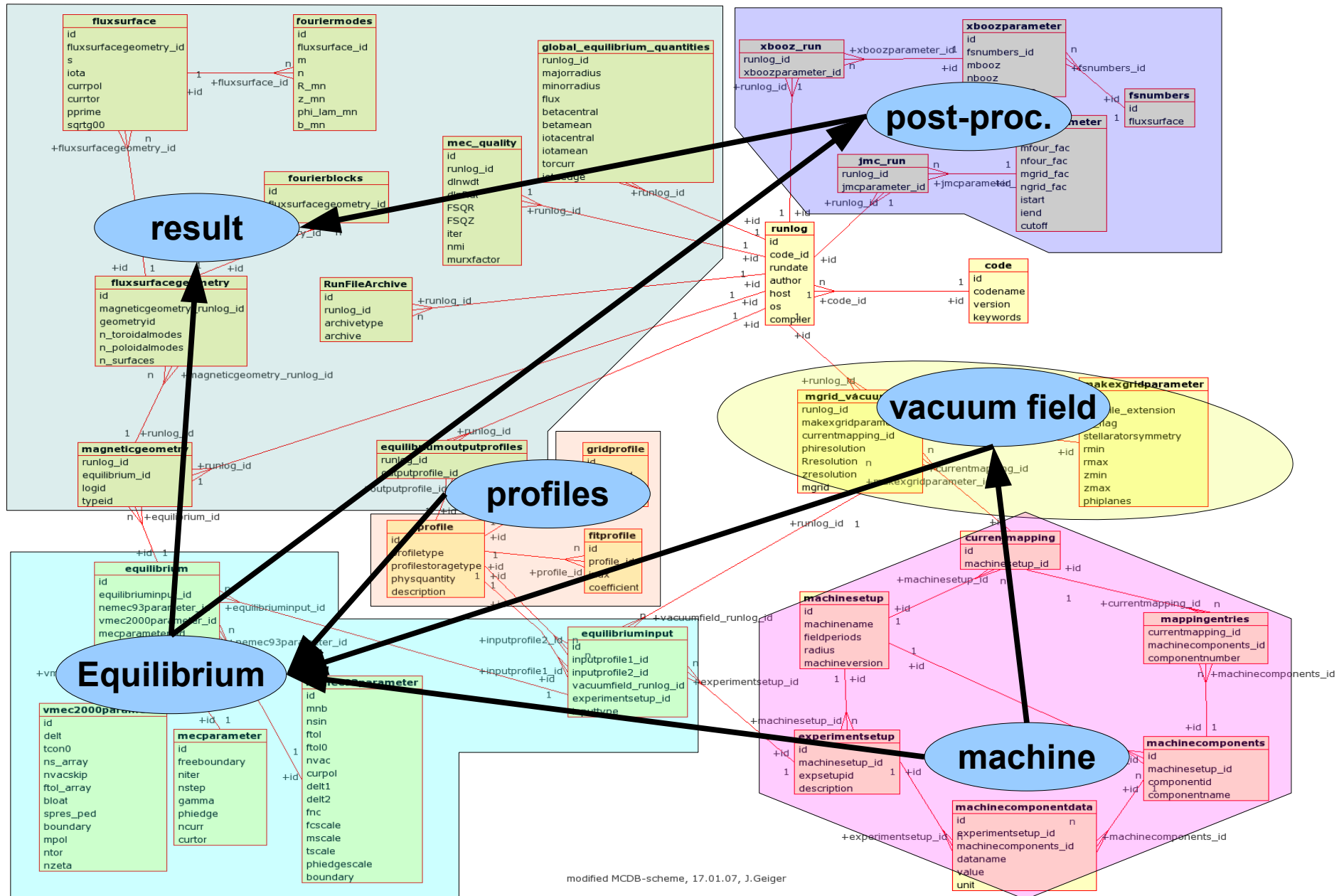
- Design goals:
  - Reflect creation process of equilibrium calculation
  - Generally usable scheme:
    - Flexible:
      - Different machines (W7-X, W7-AS, LHD, AUG, ...)
      - Different equilibrium codes (vmec/nemec, HINT, PIES,...)
      - Different equilibrium representations
        - Fourier coefficients (cyl. coord., boozer-coord., ...)
        - Grid-types
        - ...
    - Open for extensions or changes (hardware and software)
    - General applicability

# Database-scheme

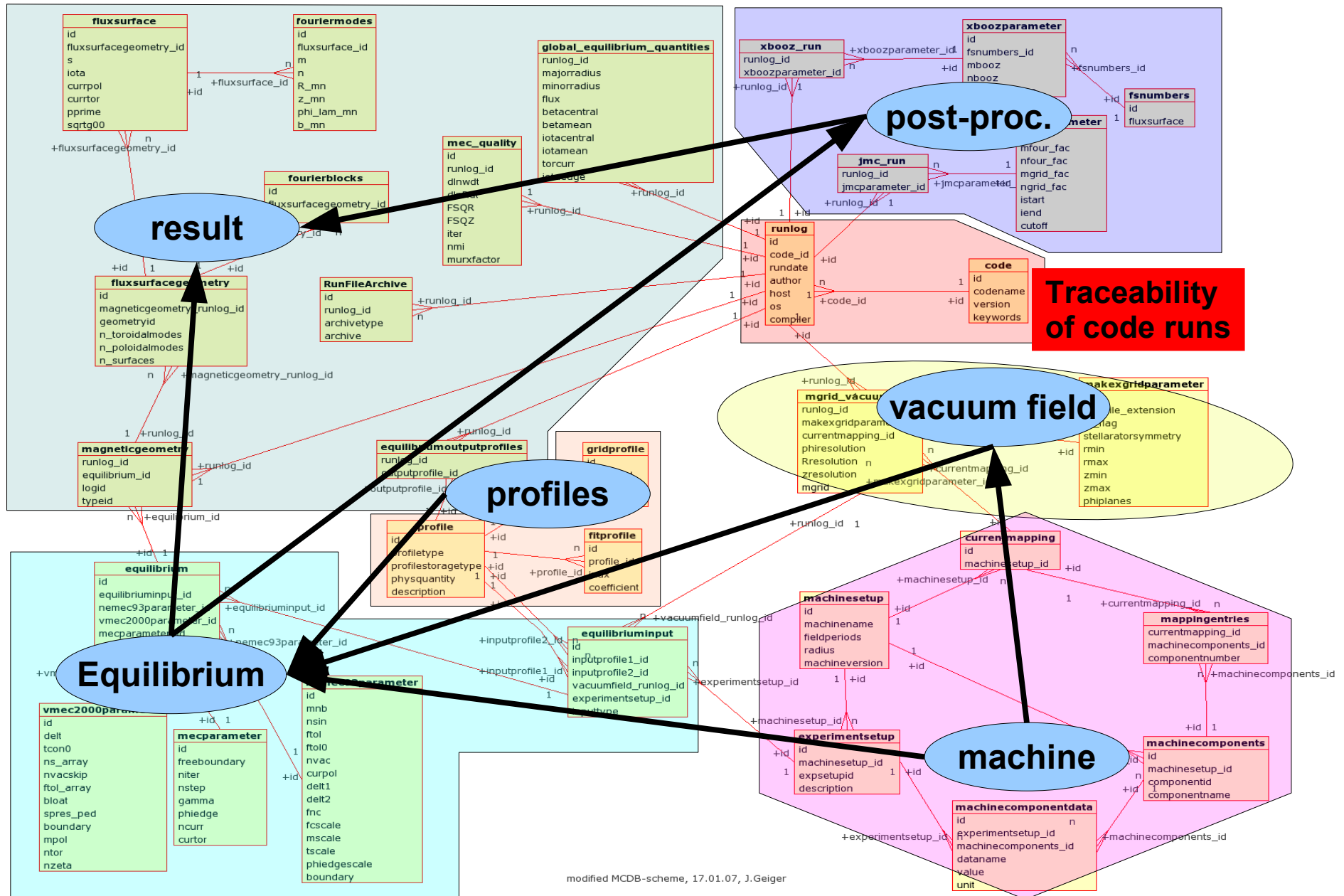


32 tables  
175 entries  
37 relations

# Database-scheme

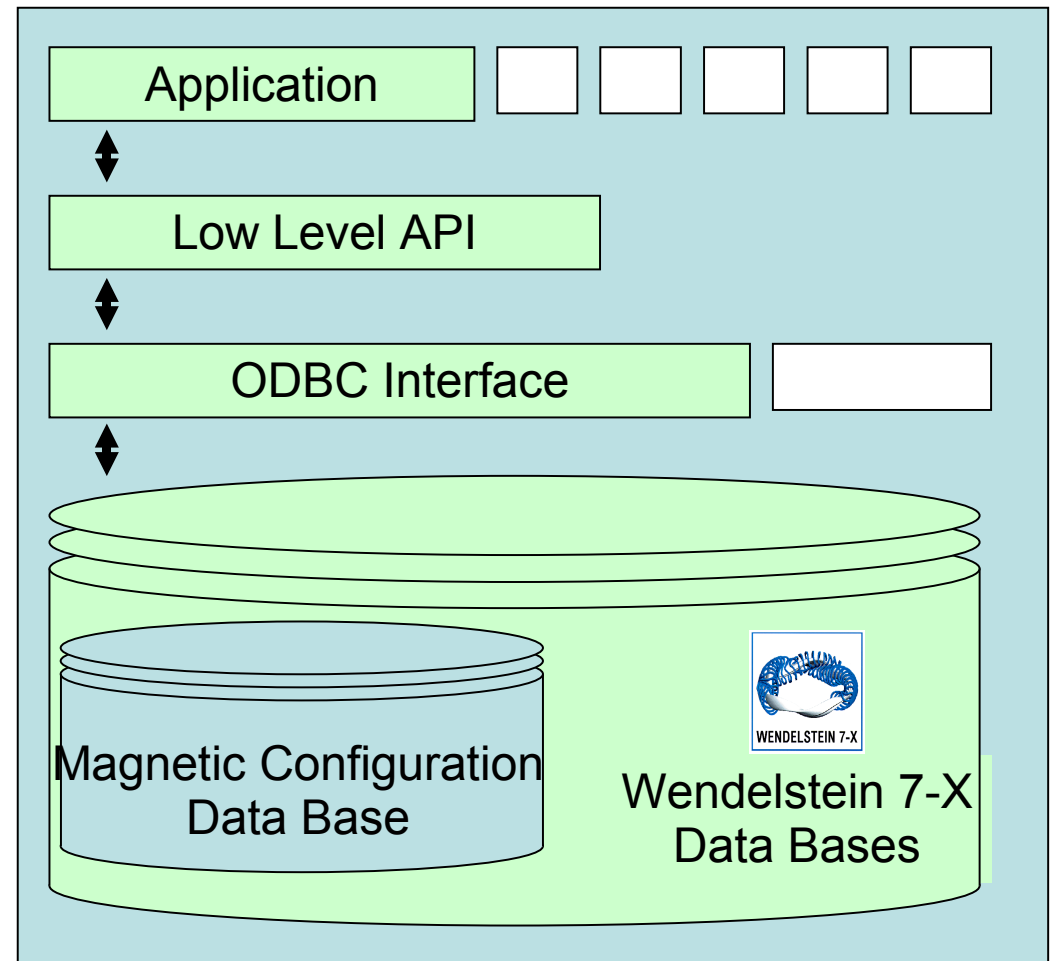


# Database-scheme



# Implementation/Status

- Current system:
  - Oracle database
  - Interfaces: odbc / API in C
- Layers and interfaces enable
  - Exchange of database
  - Upgrades of software
- Usage:
  - Mconf, mcviewer, brt (raytracing for ECRH)
  - Use from c, C++, examples in f90
  - Sample configurations of W7-X (standard, high- and low-mirror)





# Implementation/Status

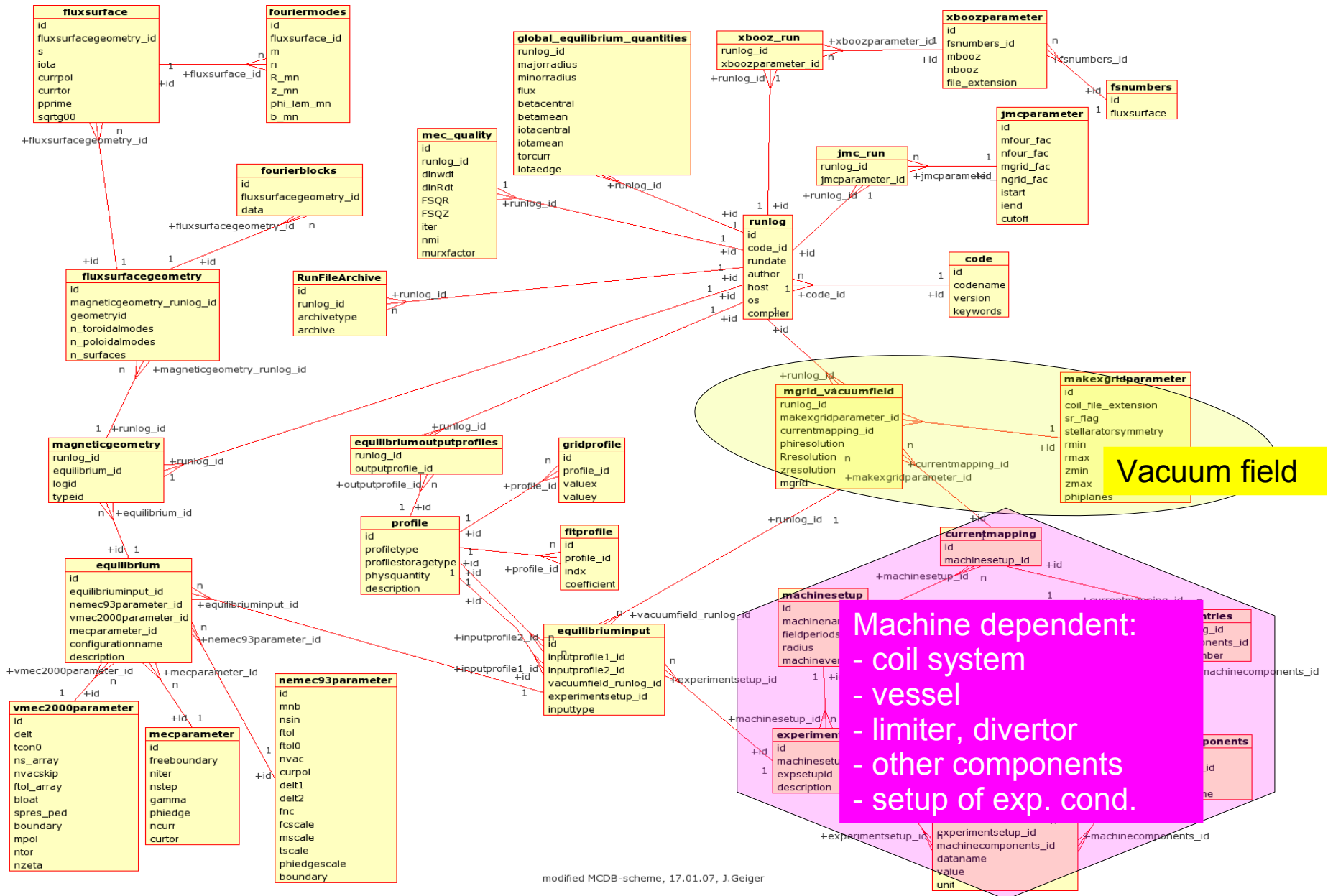
- Review of Database-scheme (improved documentation, reveal deficiencies → extensions)
- Preparation of systematic filling
  - For existing calculations
    - extract table entries consistently
    - Generate dictionaries for fixed entries ( → search capabilities)
    - Exception handling (→ externally created data sets)
  - For new calculations
    - Setup for equilibrium calculations to
      - automagically generate the necessary table entries  
→ software environment:
        - Scripts, GUIs, web-services
        - database connection to access dictionaries
        - generation of equilibrium input files ( good initial guesses from function parametrization)

# Outlook

- Implementation of extensions in
  - database-scheme (table „runfilearchive“, missing table entries, misspelling of entries)
  - API
- Complement and extend dictionaries
- Preparation of filling → **consistent** filling of the database
- Automatisations of input file generation for W7-X vmec2000 runs
  - Implementation of function parametrization results
  - Script and code/GUI development
- Database interaction: search-facilities, definition of views (get relevant data easy), consider user interface (graphical / programming) on a higher level



# Database-scheme

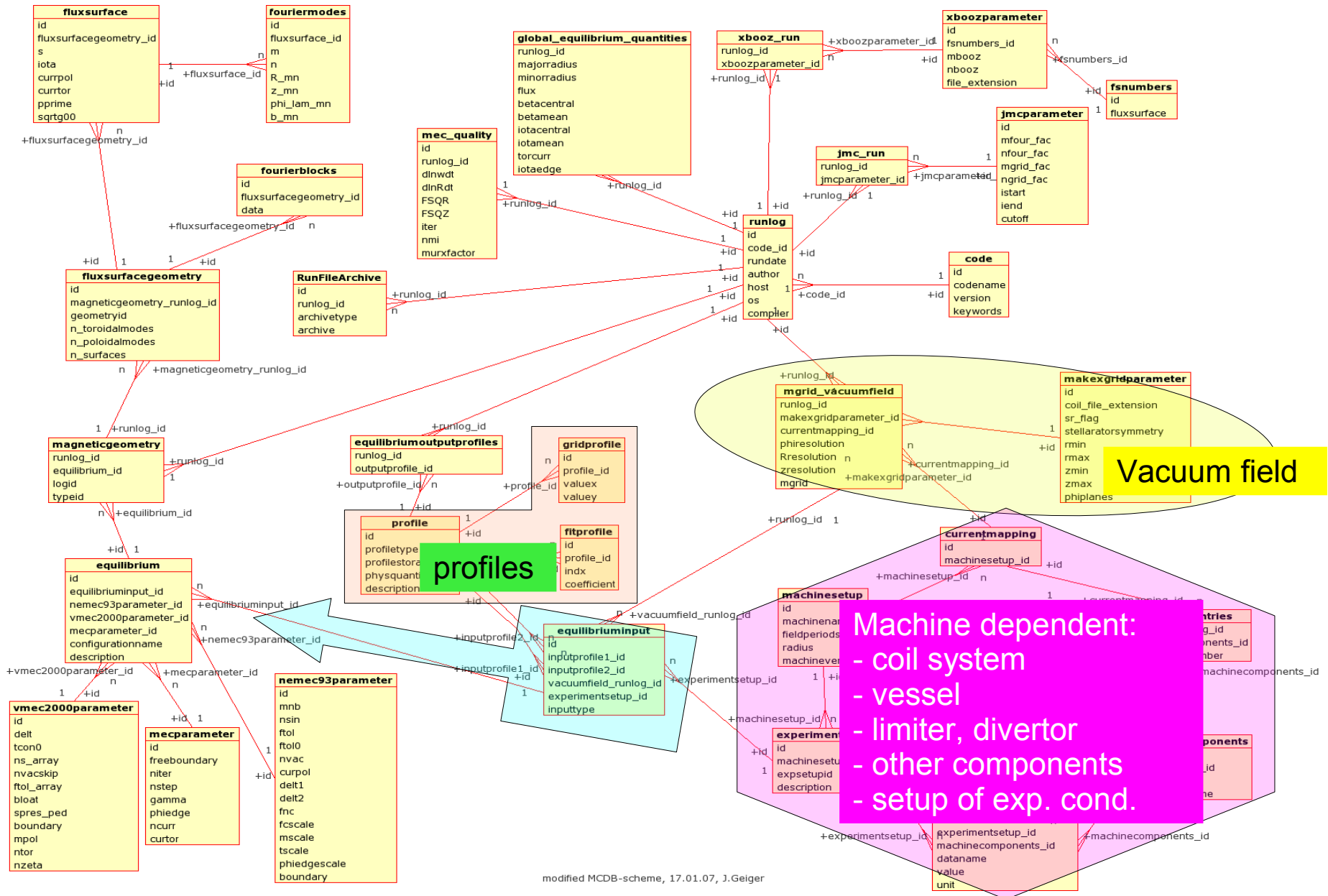


# Database details (1)

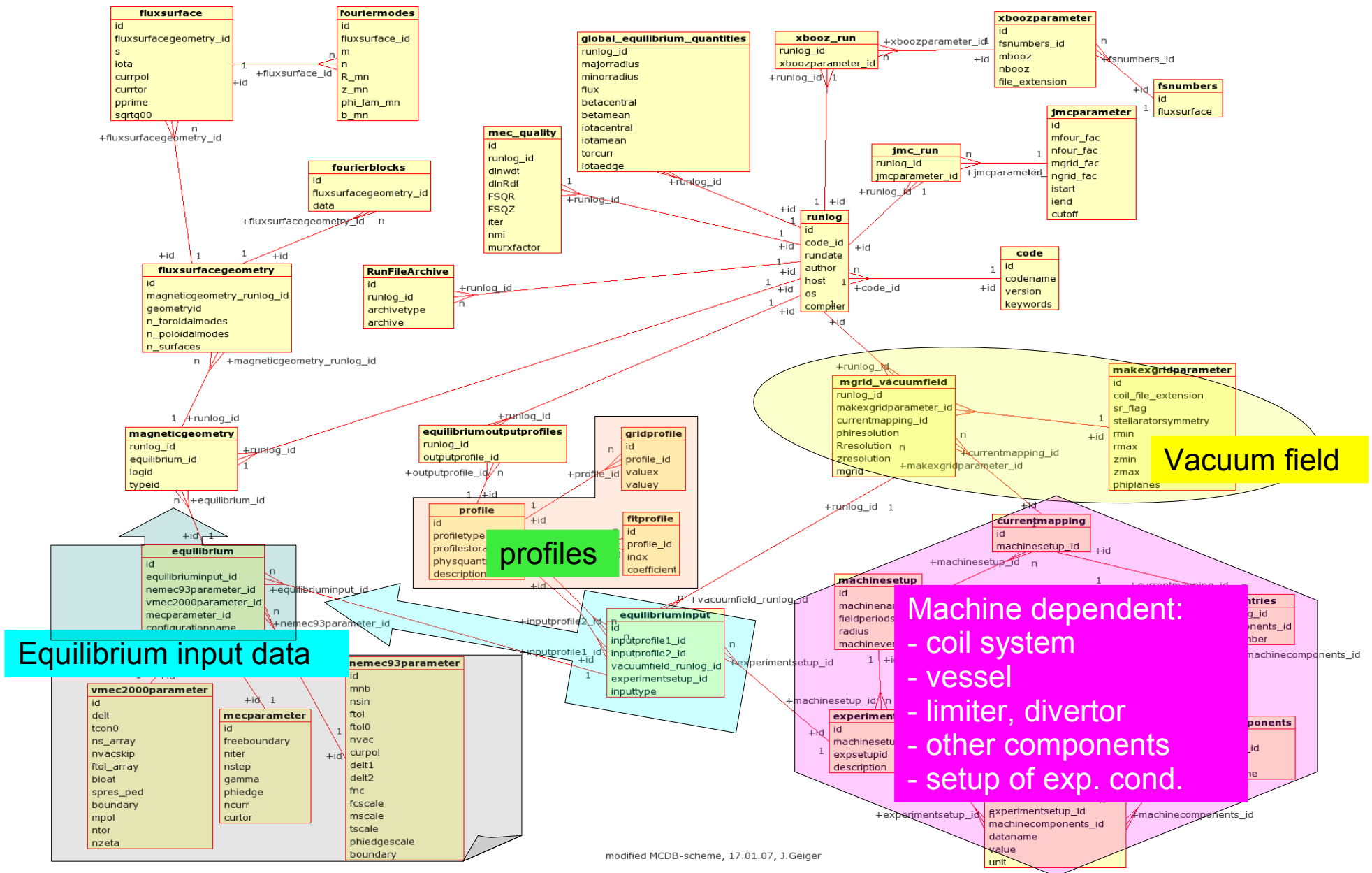
- Machine dependent part
  - Components of device
    - Coils
    - Limiters, divertor
    - In vessel components
  - Component data:
    - Coil currents
    - Limiter positions
  - Extensible during device lifetime
  - Extensible to different devices like W7-X, W7-AS, LHD, AUG, TEXTOR, ITER, ...)



# Database-scheme

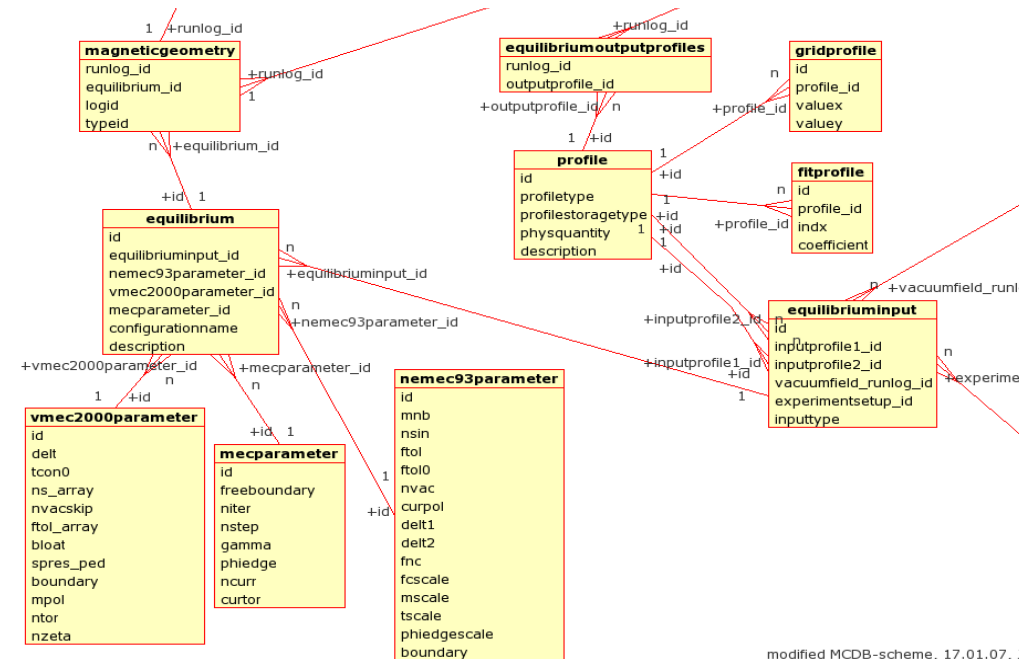


# Database-scheme



# Database details (2)

- Split equilibrium run input in
  - Code specific
    - Resolution, number of iterations etc.
  - MHD-equilibrium specific
    - 2 input profiles
    - Vacuum field
    - Machine specific part
- Result is a:
  - „magneticgeometry“



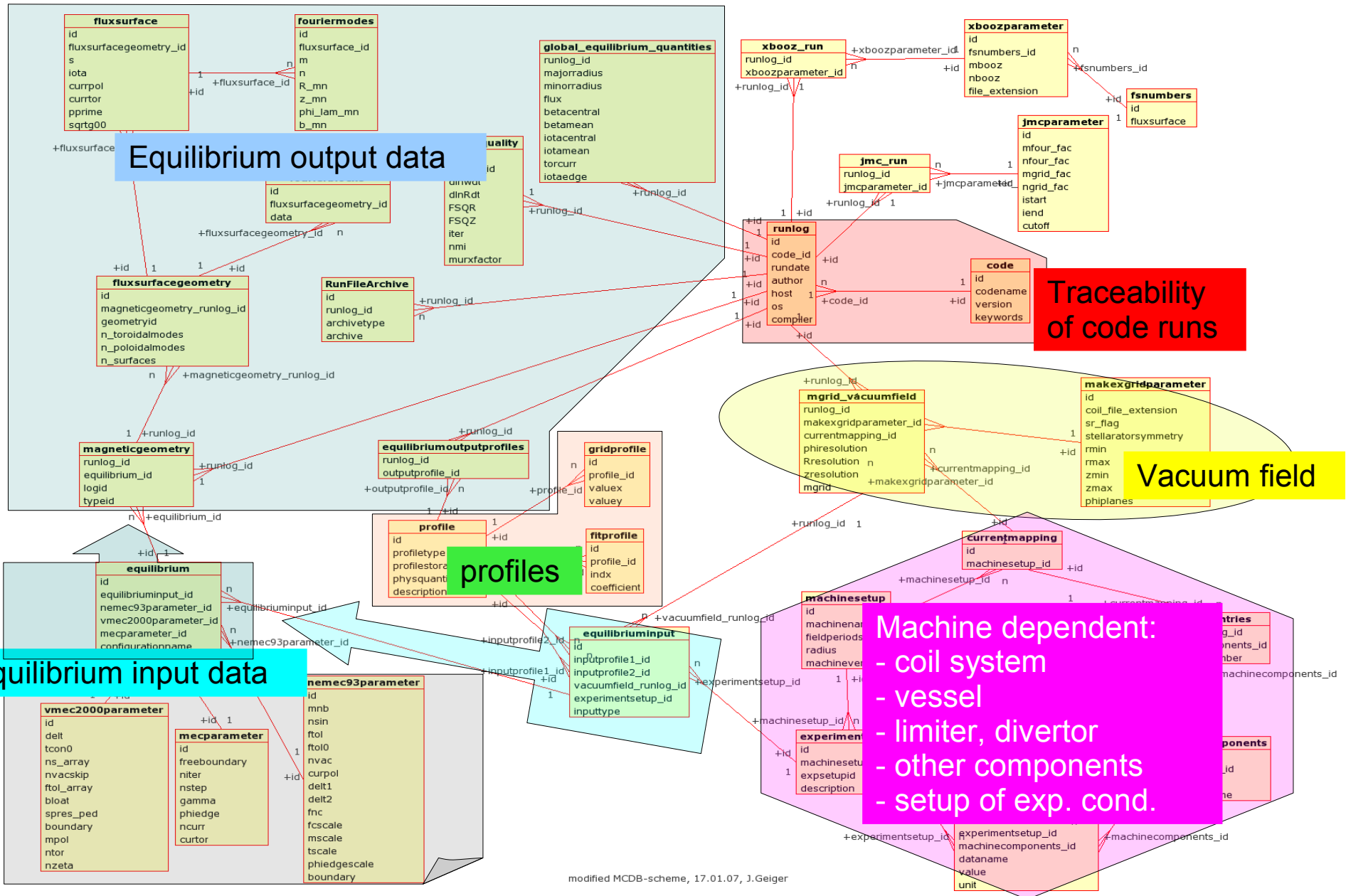
modified MCDB-scheme, 17.01.07, .





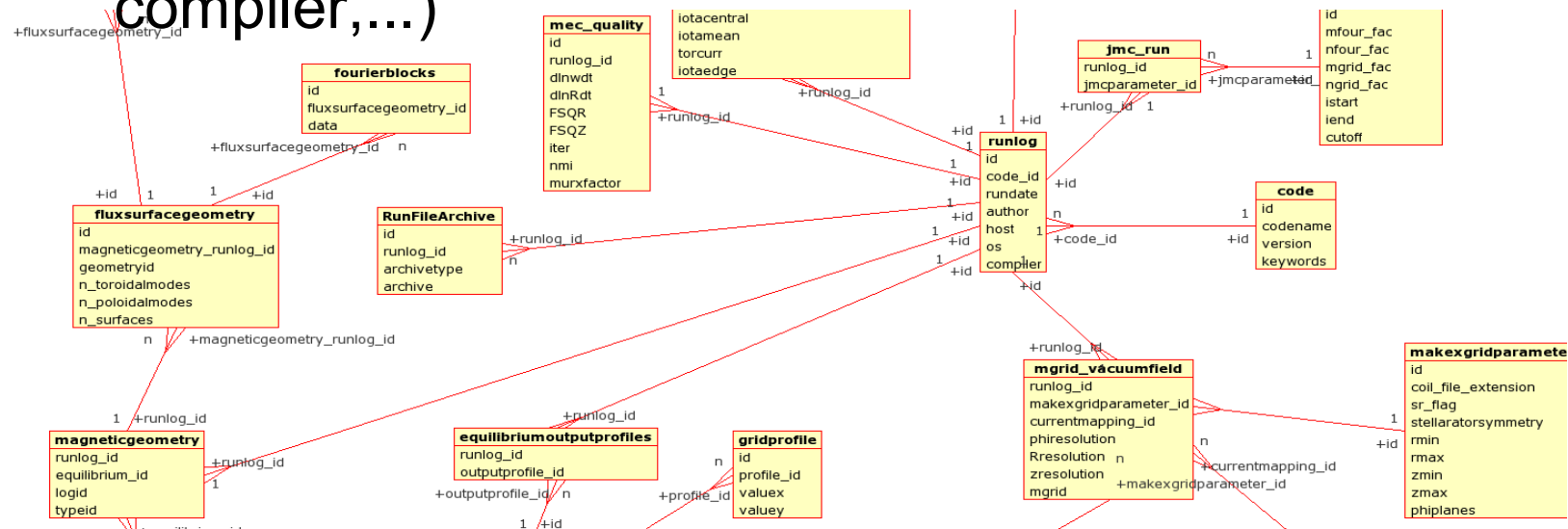


# Database-scheme

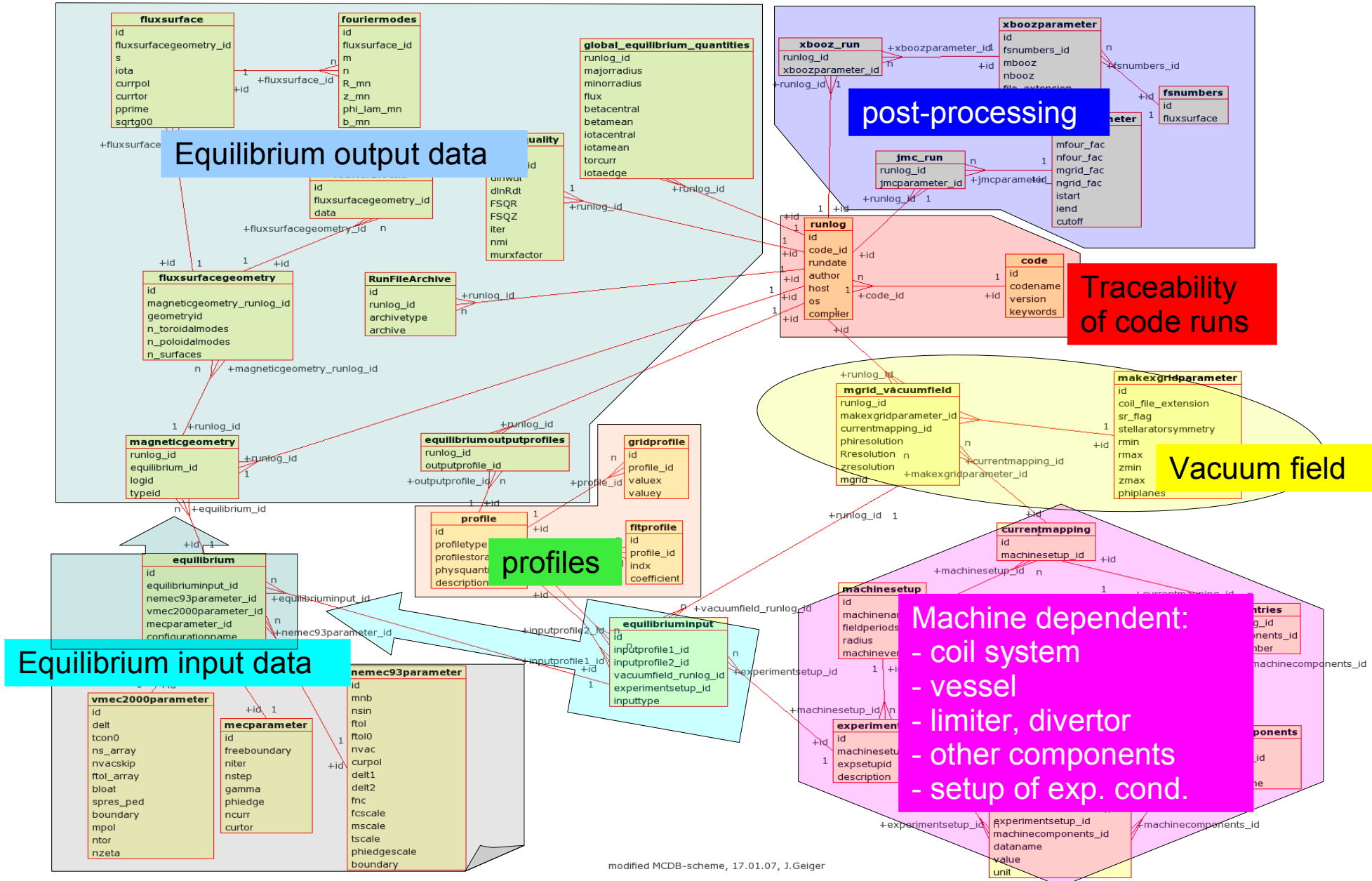


# Database details (4)

- Trace code runs
  - Runlog-table for
    - Code (name, version)
    - Author
    - Date
    - System (OS, compiler,...)
- Each run gets a unique ID:
  - Trace the production of data
  - Reproduce data from identical inputs
  - Tracking of differences



# Database-scheme



# Database-scheme

