A Complete Guide to PowerModels.jl: From First Run to Advanced Research1. The PowerModels.jl Philosophy: A Decoupled ApproachWhat is PowerModels.jl? PowerModels.jl is an open-source package for the Julia programming language, built on top of the JuMP optimization modeling layer. It is specifically designed to handle Steady-State Power Network Optimization problems.Its primary purpose extends beyond simply solving known problems. It is architected as a common platform for the computational evaluation of new and emerging power network formulations and algorithms.1 It is, by design, a tool for both power systems analysis and cutting-edge research.The Core Design Principle: DecouplingThe single most important concept for understanding PowerModels.jl is its fundamental design philosophy: the decoupling of Problem Specifications from Formulation Details.1Problem Specification (The "What"): This defines what problem is being solved. It is an abstract, formulation-agnostic definition of a task. Examples include:Power Flow (PF)Optimal Power Flow (OPF)Transmission Network Expansion Planning (TNEP) 1Optimal Transmission Switching (OTS) 1Formulation Detail (The "How"): This defines the mathematical model used to represent the physics and solve the problem.