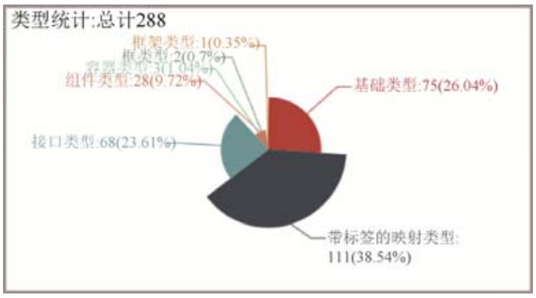

Fig.5 Statistics of types in the model

图 5 模型中的类型统计

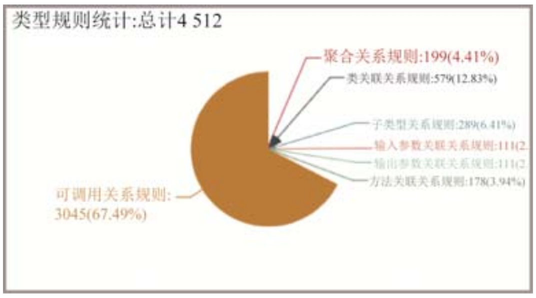

Fig.6 Statistics of typing rules in the model

图 6 模型中的类型规则统计

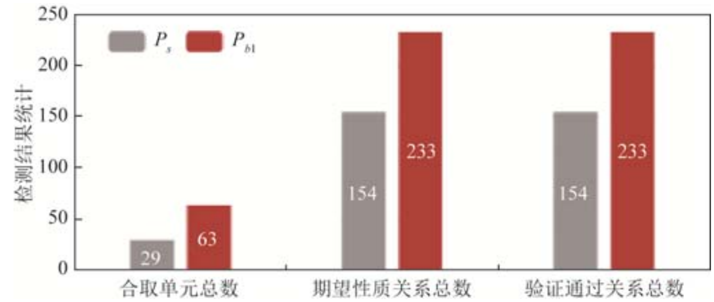

Fig.7 Results of verification

图 7 验证结果

5 结论和未来工作

本文在理论和应用上的主要贡献如下.

1) 提出了一种基于高阶类型理论的软件体系结构建模和验证语言 SAML、软件体系结构建模和验证方法 SAMM,并实现了软件体系结构建模和验证原型工具系统 SAMVS,其中,模型编辑环境支持应用软件设计过程,验证环境支持应用软件设计是否满足需求的自动化验证.

2) 提出了接口类型方法调用图刻画软件体系结构设计要求,定义了类型序列及其正确性,并提出了相关的验证算法,可以验证所创建的软件体系结构模型是否满足结构和流程相关需求,作为实际案例,采用 SAML 语言设计了某行业“互联网+”软件体系结构,并验证了设计关于需求的正确性,说明了方法的有效性.

3) 在作者及其课题组提出的类型化领域数据建模和验证方法的基础上[31],进一步扩展了形式化方法的应用规模,并实现了期望性质公式自动生成和需求满足验证过程自动化,形成了统一的、采用同一种形式化工具的软件体系结构建模和验证体系.

未来工作包括,需求变更驱动的软件体系结构重构、环境变更引起的软件体系结构重构以及软件体系结构的分解和合成演算研究.

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