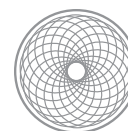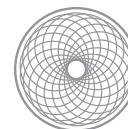# Floating-Point API for the PLP Architecture

Class Project, Spring 2013

Arizona State University

Executive Summary

Objective

To design and implement an industry standard software API for handling floating point operations on the PLP architecture.

Goals

By specification of the IEEE 754 standard, the API will provide the following capabilities to the user:

- Basic and extended floating-point number formats

- Addition, subtraction, multiplication, division, square root, remainder and comparison operations

- Conversions between floating-point formats and other numerical formats

- Floating-point exceptions and their handling, including NaN type representations.

Solution

We have divided the API into a core and extensible API. The core will provide the basic formating, verification, and exception handling routines. The extensible API will provide the arithmetic, conversion, and IO routines for the user.
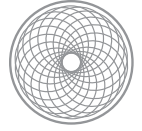
Conforming to the Standard

We have cited the IEEE Standard 754 revision 2008 as our reference on all floating-point operations. All required operations outlined in the standard are to be implemented.
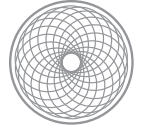
Ensuring Correctness

All core API routines and computational operations will be formally verified to ensure their correctness with respect to their specifications. These include:

- Arithmetic & comparison operations
- Sign, signaling, & NaN operations
- Conversion operations
- Exception handling & detection operations
- Rounding operations
- I/O operations

Core API

Extensible API