SMPMA System Architecture

Task (I/O pairs)

Program Synthesizer

Typed Beam Search

- Incremental evaluation
- Prioritized operations

High-score programs

Abstraction Miner

- Fixed sequence mining
- Parameterized templates
- Frequency & compression

Candidate abstractions

Meta-Learner

Cross-Task Utility Estimation

$U(a) = \alpha \cdot freq + \beta \cdot comp + \gamma \cdot search$

Promote if $U(a) > 0.6$

Promote high-utility

Expanded DSL (online evolution)

Abstraction Library (DSL)

Primitives

flip_v, keep_color, fill...

Learned Abstractions

47 fixed sequences
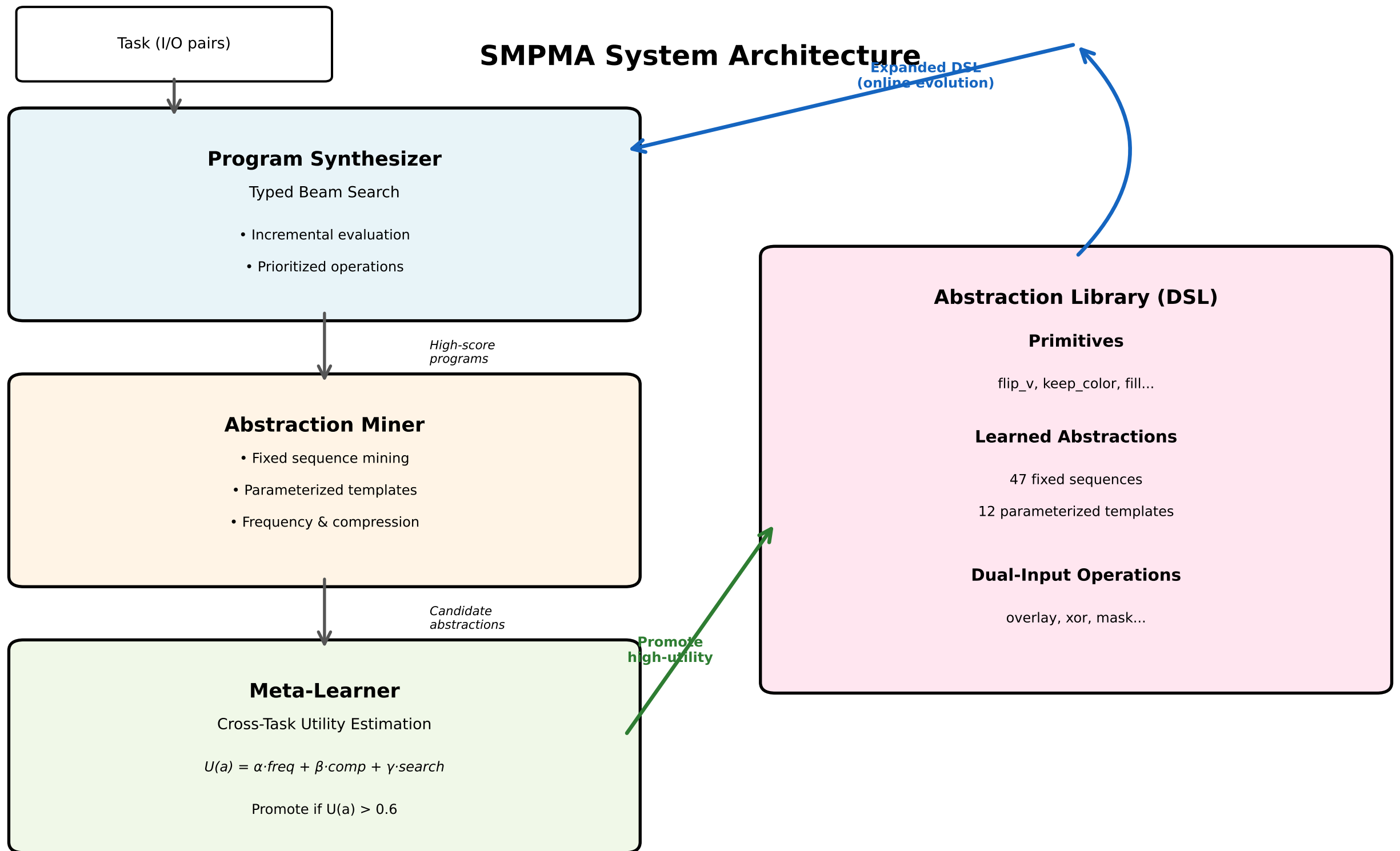
12 parameterized templates

Dual-Input Operations

overlay, xor, mask...

Self-Modifying Capability Space

System expands its operational repertoire during inference