$\mathcal{P}(\mathbb{x},\mathbb{w})$

$\mathcal{V}(\mathbb{x})$

$\mathbf{P}_{\mathsf{IOP}}(\mathbb{x},\mathbb{w})$

rt_1

MT.Commit f

$\boldsymbol{\Pi}_1$

$\boldsymbol{\rho}_1$

rt_2

MT.Commit f

$\boldsymbol{\Pi}_2$

$\boldsymbol{\rho}_2$

rt_k

MT.Commit f

$\boldsymbol{\Pi}_k$

$\boldsymbol{\rho}_k$

- sample IOP randomness $\boldsymbol{\rho}_1$
- sample IOP randomness $\boldsymbol{\rho}_2$
- sample IOP randomness $\boldsymbol{\rho}_k$
- check MT proofs

  $\wedge_{i\in[k]}$ MT.Check^{f} $(\mathrm{rt}_i, Q_i, \boldsymbol{a}_i, \mathrm{pf}_i)$
- check IOP decision

$((Q_i,\boldsymbol{a}_i,\mathrm{pf}_i))_{i\in[k]}$

IOP verifier queries: $(Q_1,\ldots,Q_k)$

IOP oracle answers: $(\boldsymbol{a}_1,\ldots,\boldsymbol{a}_k)$

MT proofs: $(\mathrm{pf}_1,\ldots,\mathrm{pf}_k)$

$\mathbf{V}_{\mathsf{IOP}}^{[Q_i,\boldsymbol{a}_i]_{i\in[k]}}(\mathbb{x},(\boldsymbol{\rho}_1,\ldots,\boldsymbol{\rho}_k))$