

# **Hierarchical Cluster Engine (HCE) project**

**v1.1.1 internal architecture**

IOIX Ukraine 2013-2014

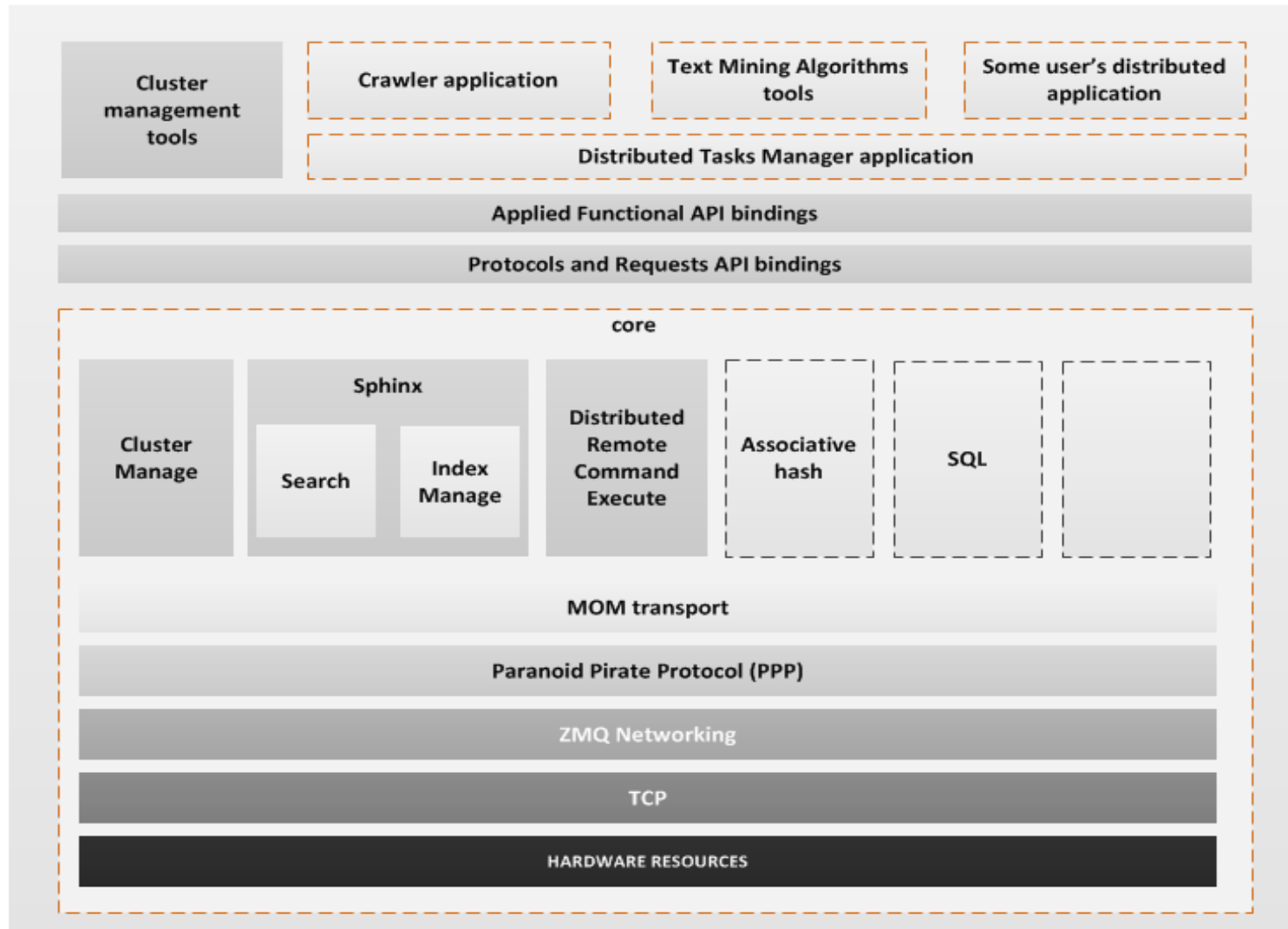
# Introduction

This presentation shows main basic principles of general internal architecture and algorithms for newcomers to help to understand better the usability advantages and potential efficiency of HCE. For project architects, system integrators, general architecture design engineers, team leaders and technical management staff this information will help to understand better the possible place and role of HCE as engine and tool in the target project, to imagine the potential goals and possible to answer on several general questions about possible integration...

The HCE as engine has core architecture that represents main feature – to construct, build and hold network cluster infrastructure based on ZMQ PPP transport protocol that lays on TCP under Linux OS and is core on system-layer.

The HCE as framework has set API binding on user's layer functionality.

# Layers of HCE architecture



# HCE networking and threading

Cluster core implemented on POSIX multi-thread computation parallelism and distributed multi-host requests processing on MOM-based networking model.

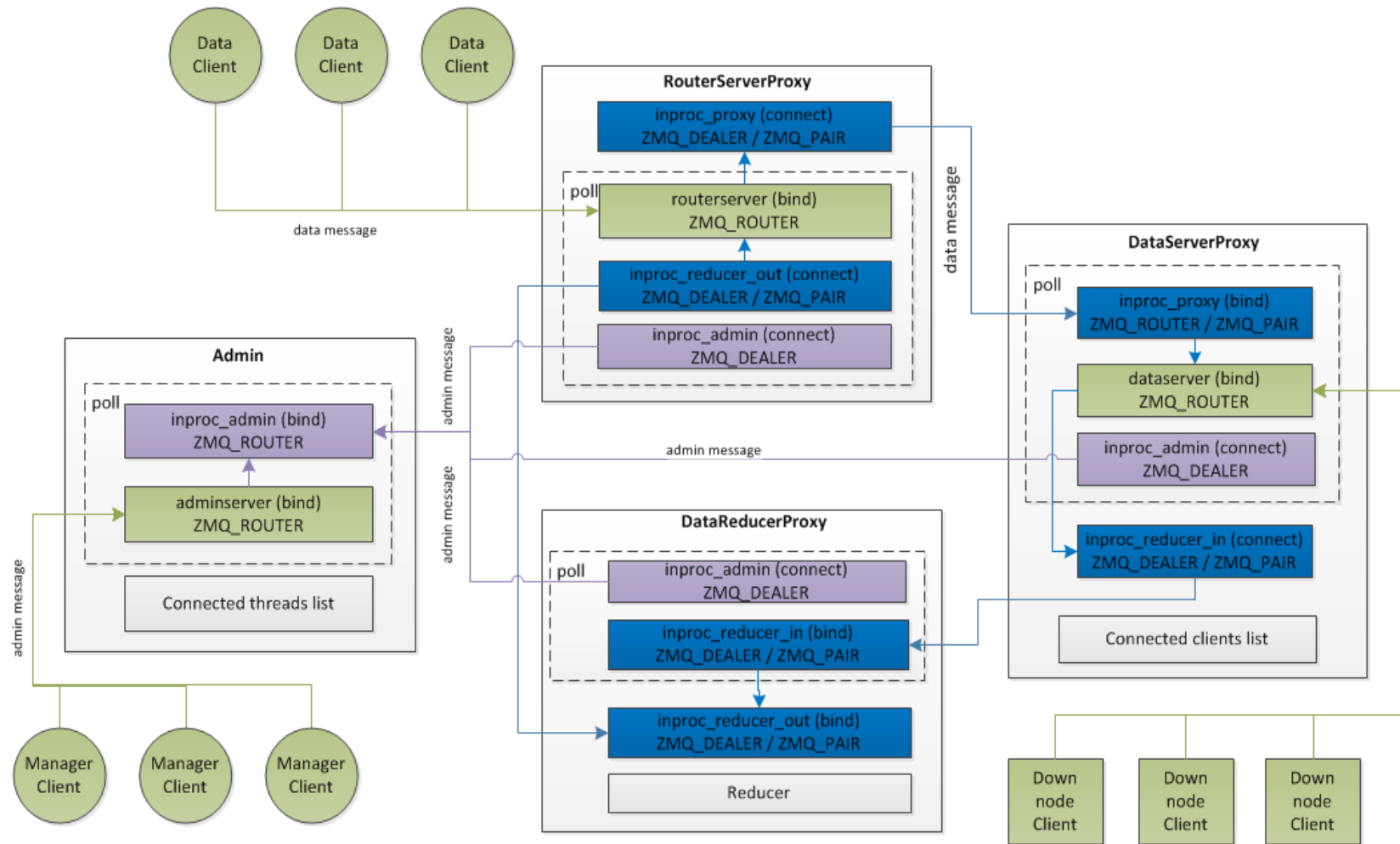
Main cluster infrastructure based on different roles of nodes, separated data and admin requests handling by using two dedicated ports, asynchronous messages handling and processing based on ZMQ inproc sockets. Also is ready to be transactional and redundant.

The concrete internal threading architecture and messages routing model of HCE node instance depends on role is static and can be one of “**router**”, “**manager**” or “**data**” that is defined on start.

Messages routing of “**data requests**” messages for “**descent flows**” as well as messages collecting algorithm and reduce data processing for “**ascent flows**” depends on manager node mode – “**shard**” or “**replica**”.

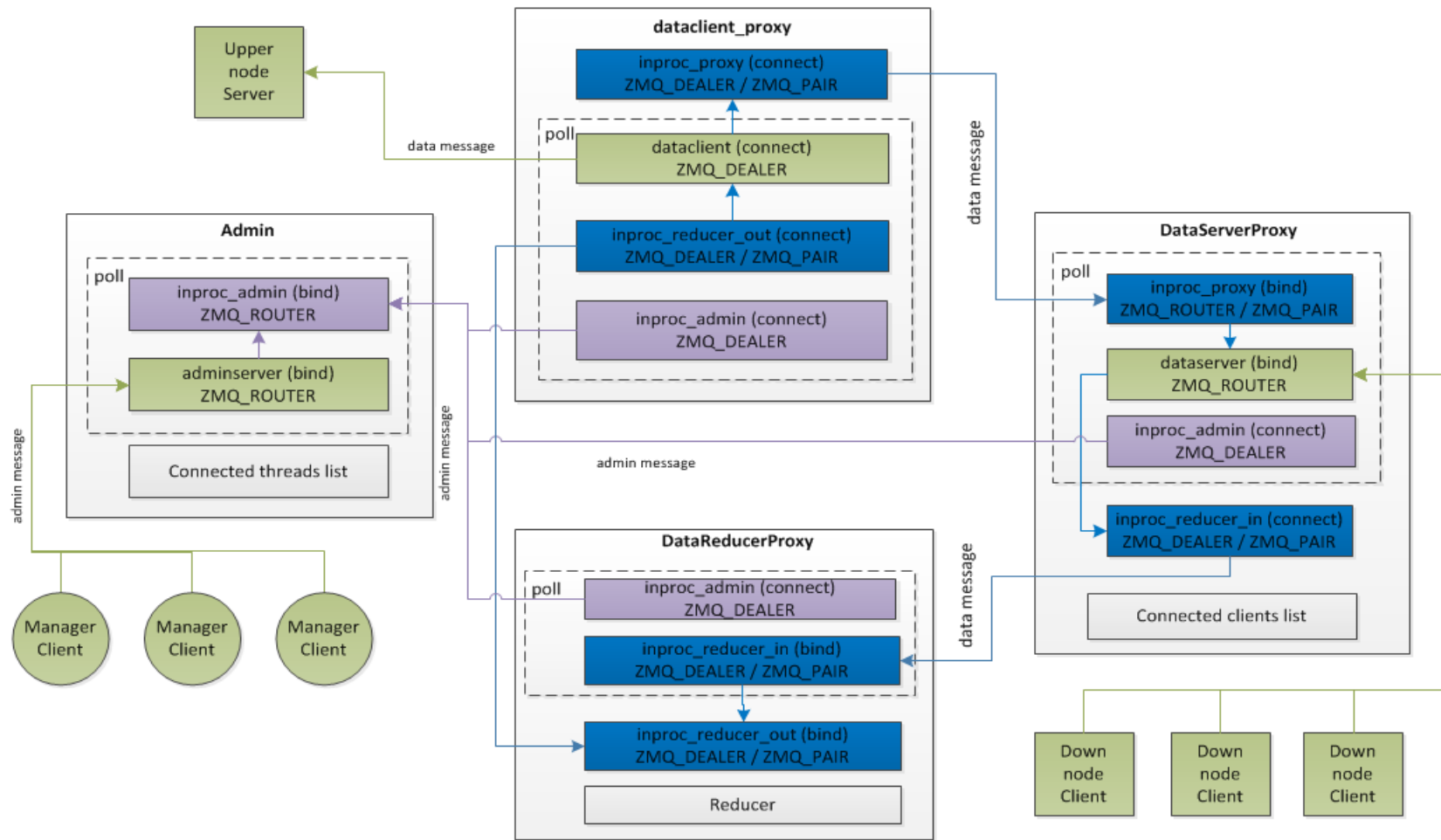
# Node architecture in router mode

Multi-threaded node network model based on ZMQ sockets v0.5 : router node



# Node architecture in manager mode

Multi-threaded node network model based on ZMQ sockets v0.5 : manager node (shard or replica)



# Node architecture in data mode

Multi-threaded node network model based on ZMQ sockets v0.5 : data node (replica or shard)

