

This file contains the 3 presentations that made up The Open Group's presentation to the 2012 DMTF Alliance Partners' Technical Symposium.

The 3 presentations describe various activities of The Open Group which are directly linked to the work of the DMTF, SNIA and other Alliance Partners.

The 3 presentations are as follows:

1. Overview of The Open Group's Open Management Project
2. Overview of the OpenPegasus project
3. Overview of the Open Management Infrastructure project

# Open Management Project

Martin Kirk  
The Open Group

# Open Management Project

- ❑ A family of open source projects creating an infrastructure for open management based on the DMTF CIM/WBEM standards
- ❑ OpenPegasus – A 10-year old project, shipped on most UNIX™ and Linux systems and in many network storage systems. The de-facto standard for open server management
- ❑ OMI – A new implementation, brought to The Open Group by Microsoft
- ❑ ??? – Looking for possible new projects that fit with this infrastructure, e.g. open source providers, etc

# Useful Links

- ❑ [www.opengroup.org/openpegasus](http://www.opengroup.org/openpegasus)
- ❑ [www.opengroup.org/omi](http://www.opengroup.org/omi)
- ❑ [collaboration.opengroup.org/pegasus](http://collaboration.opengroup.org/pegasus)
- ❑ [collaboration.opengroup.org/omi](http://collaboration.opengroup.org/omi)
- ❑ [collaboration.opengroup.org/omp](http://collaboration.opengroup.org/omp)



# OpenPegasus Status and Overview July 2012

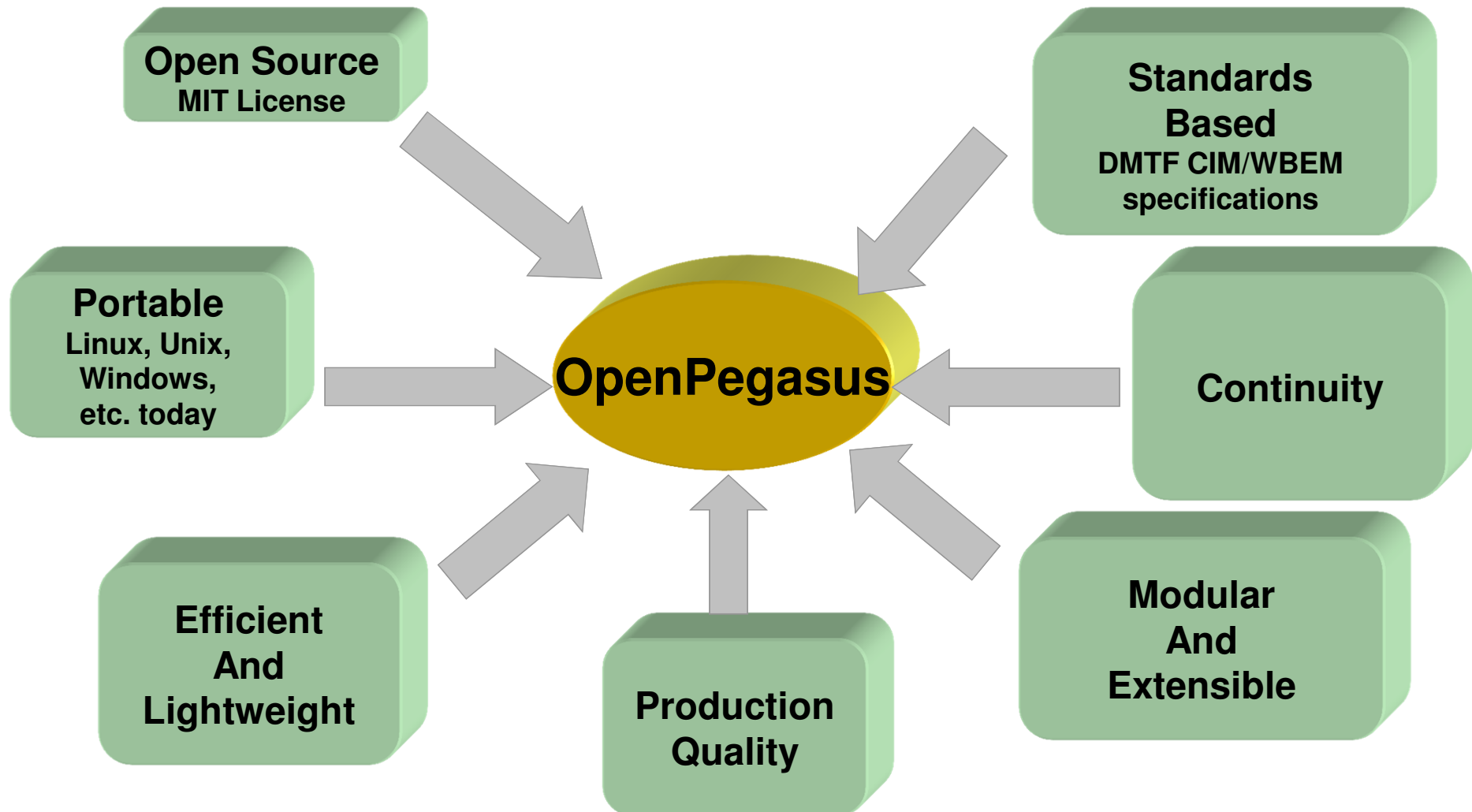
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Presented to DMTF Alliance Partner  
Mtg. July 2012



# OpenPegasus Objectives





# OpenPegasus Architecture & Components

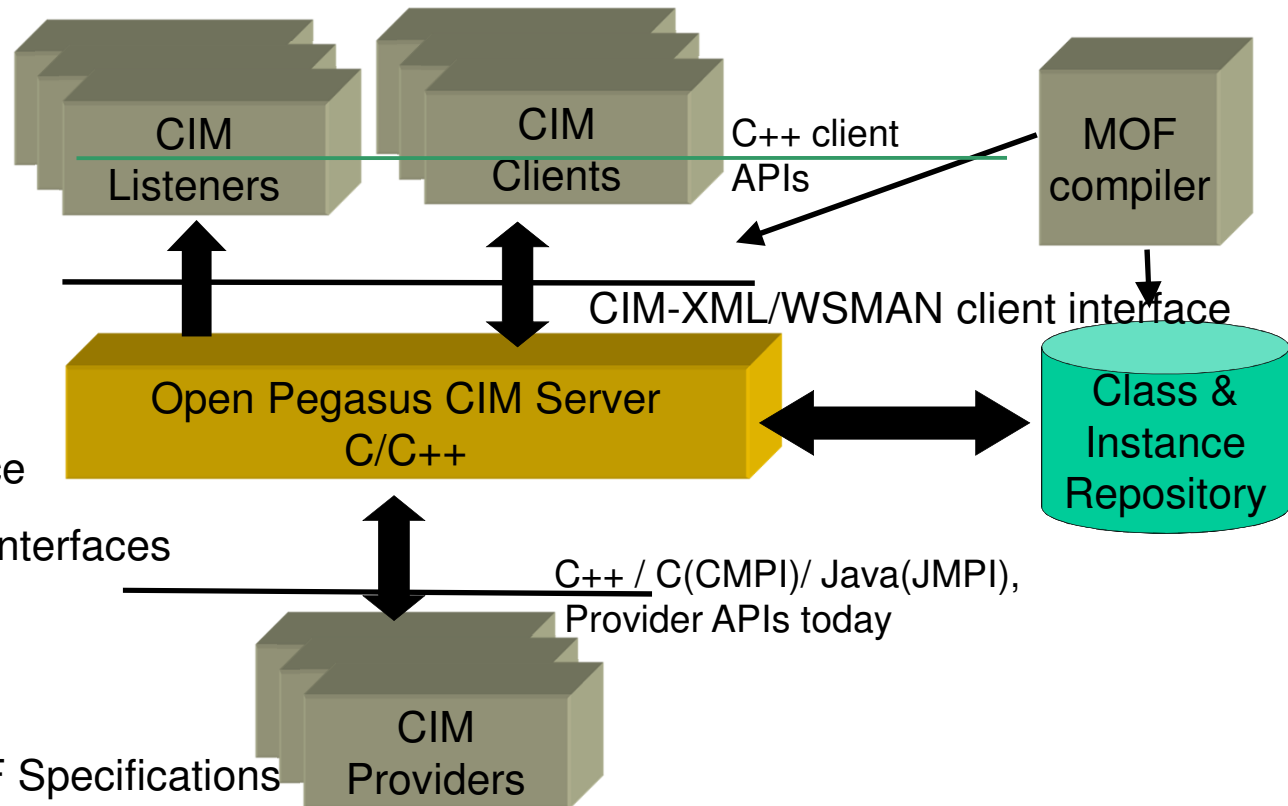


## •Pegasus Components

- CIM Clients and Listeners
- CIMServer
- CIM Providers
- MOF Compiler
- Build/Test Environment

## •Public Interfaces

- Pegasus C++ Client Interface
- CMPI, JMPI, C++ Provider Interfaces
- SNIA Java Client Interface
- Protocols
- CIM/XML & WSMAN (DMTF Specifications)
- Binary Client Protocol (OpenPegasus)





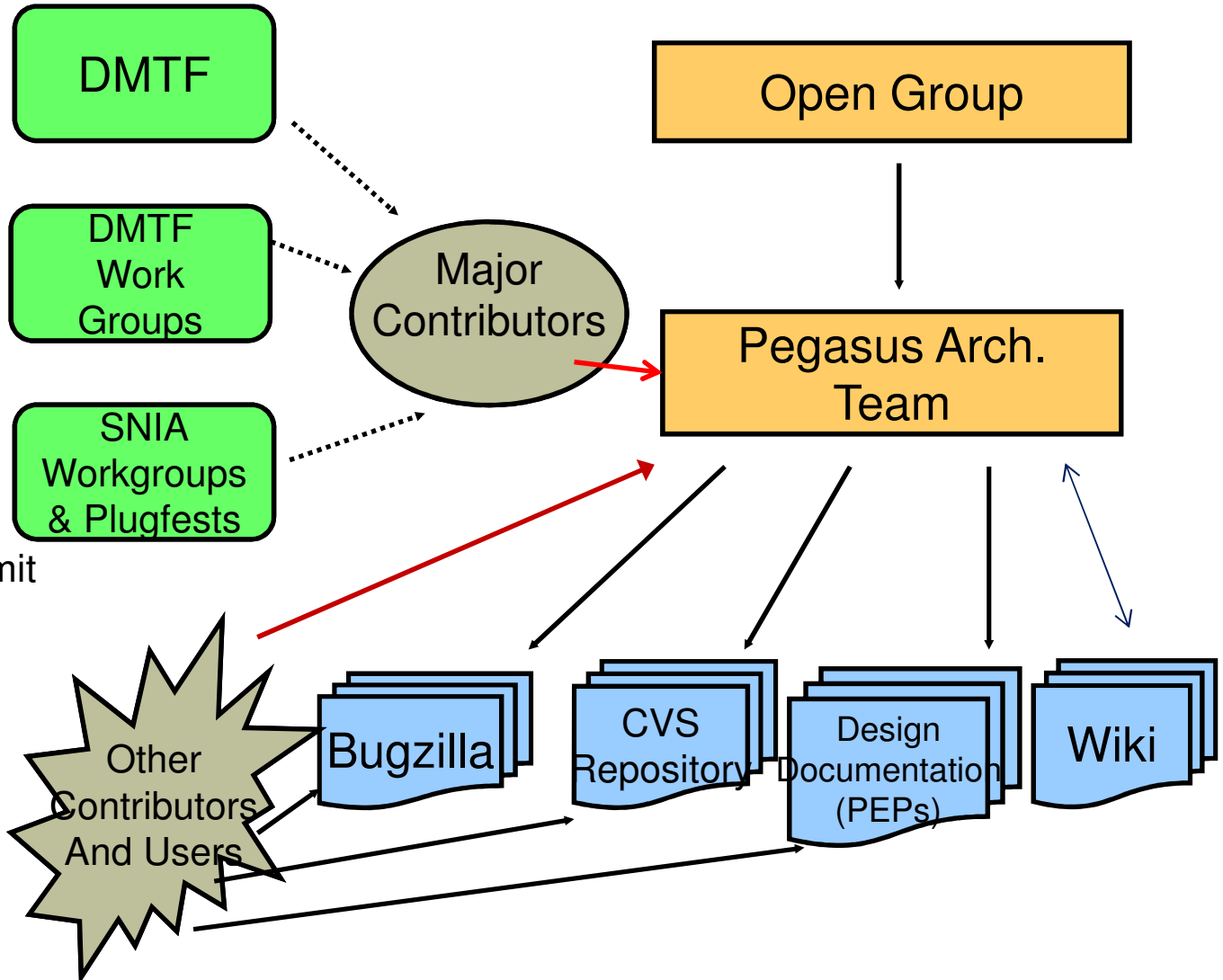
# The Pegasus Project

Community Project  
Multiple supporters  
Multiple developers  
Multiple users  
Open documentation  
and discussion

Open source-code &  
project

Documented processes  
Support tools (bugzilla,  
websites, WIKI, etc.)  
Defined releases, commit  
procedures, etc.

Work With DMTF & SNIA)







# Overall Status Today



- Matches DMTF Specifications
- Quality acceptable to major OS vendors today (ex. IBM & HP)
- Used both in General OSs and embedded environments
- Continuing project with regular releases, extensive testing and communication back to standards groups.

See website ohloh "In a Nutshell OpenPegasus" for overview of OpenPegasus project and code over its life.  
<http://www.ohloh.net/p/3397?p=OpenPegasus>



# What's New

- **OpenPegasus 2.11.0 Release – May 2011**
  - Currently supporting versions 2.11, 2.10, 2.9
- **OpenPegasus 2.12.0 – Planned Sept 2012**
- **Regular release of updates to previous versions**
- **Short Term Next Steps Post 2.12**
  - New Functionality
- **Major Developers Face-To-Face Sept 2012**
  - Location Bangalore India
  - 2 Week F2F
  - Plan next major steps for OpenPegasus



# Project Changes

- Recent Changes to Project
  - All planning done through the Architecture Team
  - Contribution acceptance by ballots executed from recognized individuals(Committers) i.e. meritocracy model
  - Previous version updates (ex. 2.11.1) will only be bug fixes, no new functions in these updates
  - Moving to WIKI as basis for discussion and documentation.
    - More flexible and dynamic
    - Simplified integrating developer and user documentation
  - Returned to regular telecons, WIKI, IRC, etc. for communication.



# Platforms and Availability



- Platforms Supported
  - Linux
  - HPUX
  - AIX
  - Solaris
  - VMS
  - Z/OS
  - Windows
- Availability
  - Source
    - Tar for each release
    - Source rpm for each release
    - Pegasus CVS
  - Binary
    - Several Linux distributions
      - Fedora
      - Redhat
    - Part of distribution of other OS's
      - Open Solaris
      - HP UX
      - AIX
      - Z/OS



# OpenPegasus in one page



- All major WBEM components
  - (server, client/listener infrastructure, compilers, some providers, test suite, CQL, WQL, Indication Support, security)
  - Major Protocols, CIM/XML & WSMAN
- Project
  - Community project under auspices of The Open Group
  - Major contributors, HP, IBM, Microsoft
  - Project Lead– The Open Group
- Regular Releases
  - ~ 10 month cycle
- Availability
  - Source (cvs, rpms, tarballs)
  - Binaries for Linux (RedHat distributions)
- Major users
  - HP, IBM RedHat
  - Multiple SNIA SMIs server implementers.
- Platform Target
  - Initially broad set of OS/Platforms
  - Embedded systems
- Platforms Supported
  - Linux, Unix, Mac, Windows, VMS, ZOS
- License
  - MIT License
- Provider Types
  - Pegasus C++ (OpenPegasus)
  - CMPI ( C OpenGroup Spec.)
  - Java (SNIA Provider Interface today)
- Development Language
  - C/C++
- Client API Language
  - C++
  - Java
- Client Protocols
  - CIM/;XML
  - WS-Management
  - Binary



# Pegasus 2.11 New functionality

- Version 2.11.0
  - Improve Out-of-Process support
    - Dynamic grouping of modules into processes
    - Improved isolation, provider recovery, etc.
  - DMTF Indication Profile implemented
    - Implement Profile Delivery failure/retry
    - Implement statistics on Indication delivery
  - Completed all required WSMAN operation features in Server
  - 32 bit providers with 64 bit OpenPegasus
  - Numerous bug fixes



# OpenPegasus 2.12 Functionality (Planned)



- Goals
  - WS-MAN Eventing
  - Remove SNIA SMI issues
  - Major Old bug cleanup
- Major Changes
  - Add WSMAN subscription support and partial handling and delivery support
  - Clear number of SMI issues
    - Interop namespace name (i.e. interop)
    - Remove special SMI build flags
    - Minor discrepancies in behavior



## OpenPegasus 2.12 Functionality Changes (Cont)



- Major Changes (cont)
  - Extend test client (cimcli) to handle embedded objects, new operations, etc.
  - Improve admin tools documentation/help
  - Extend ExecQuery default to CQL
  - Implement configurable cipher suites for SSL
  - Extend support to CLANG compiler
  - Extend all indication listeners to support SSL
  - Implement Admin control of hostname for providers
  - Significant bug resolution (~ 200 bugs)





## Next Short Term Objectives (Post 2.12)



- Reorganize OpenPegasus Configuration
  - Web based runtime administration
  - Standards based configuration
    - Linux ./configure basis for source configuration
  - Simplify build configuration variations
- Further performance/footprint improvements
- Improve embedded environment support
- Add CIM/XML Pull operations
- Resolve behavior issues
  - Version 3.0

**A Wish List is not a  
commitment.**

Commitments only come  
when someone agrees to do  
the work, not just that they  
need it.



## Short Term New Functionality (cont)

- Looking at the longer term
  - Planning next several versions at F2F this year (see next slide)
  - This will define long term directions and modify some short term objectives and schedules



# OpenPegasus Developer F2F



- Bangalore India 15 – 28 Sept 2012
  - Hosted by HP and IBM India
  - Because many developers in India
- Open to all Pegasus developers
  - Special day for Users (see announcement)
  - WEBEX where required
- Goals
  - Define major goals for next several versions
  - Discuss/define design strategies to meet these goals
  - Improve communication within core team
    - OpenPegasus development/usage is worldwide



## F2F (Cont)

- Typical Major Topics
  - Define major features for next several versions
  - Define simplification of all configuration/admin
  - Define Performance Improvement goals/design
  - Improve support for profiles
  - Define profiles to be implemented by Pegasus
  - Improve modularity
  - Simplify Development of OpenPegasus, providers and Clients



## Developer F2F (Cont)

- The Architecture Team considers this a major event because:
  - Difficult to get F2F time in current environment
  - Much of Pegasus development moved to India
  - Much of CIM provider/client development moved to India
  - Will include major OP development groups
- See wiki for more info:
  - [https://wiki.opengroup.org/pegasus-wiki/doku.php?id=architectureteam:architecture\\_f2f\\_meeting\\_2012](https://wiki.opengroup.org/pegasus-wiki/doku.php?id=architectureteam:architecture_f2f_meeting_2012)



# OpenPegasus Issues Today

- General
  - Expanding size of Working Group
  - Binary availability on some platforms (ex. Windows)
  - Expanding input of users to project
  - Pegasus Open Model not consistent with Stds groups closed development model
- Function
  - Pull Operations (committed to 2.13 or 3.0)
  - Configuration complexity



# Working With the Pegasus Project

- Using the Code
  - Free for use. Multiple and growing number of sources for access to Pegasus
- Contributing to the Project
  - Outside contributors
    - In Company
    - Specific financed projects
    - Contribute via patches or authorized developers
  - Join or follow the PEPs and Architecture Team
    - No commitment to join required to participate
    - There is no free lunch.
  - Join the Architecture Team
    - Influences priorities, commitments, releases.
    - Open membership



# Sources for access to Pegasus

- OpenPegasus CVS
  - Source for all Releases
  - Current unreleased work (head of tree)
- Linux Source RPM's for releases
  - Pegasus web site
- Release source tarballs
  - Pegasus web site
- Redhat AS and Fedora
  - Binary rpms
- Binaries available with specific Unix platforms
- OpenSUSE
  - Binary rpms
- InovaDevelopment web site ( in process now)
  - Binaries for multiple platforms combined with development tools





# Pegasus Who's Who



- The Major Pegasus Contributors

- EMC
- HP
- IBM
- Microsoft
- Sun
- Inova Development

## Who Uses Pegasus?

We only know who is using Pegasus through those who participate (bugs, questions, contributions). In fact we don't really know how much Pegasus is being used.

- Major Pegasus Users Today we know of:

- EMC
- HP
- IBM
- Novell OpenSUSE
- RedHat Enterprise Server
- SNIA SMI embedded systems
- ...



# Getting Support

- Ask the Pegasus mailing Lists
- File Bugs
  - And follow up
- Attend the Pegasus calls
  - Squeaking wheels and all that
- Contract 3<sup>rd</sup> Party for support/maintenance
- Ask questions on the OpenPegasus IRC



## Relating Pegasus to work inside companies

- Pegasus is not a hacker project
- License accepted by major IT suppliers
  - We use MIT license for a reason
- Code investment by major IT suppliers
- Function and schedule driven by user needs
- Function driven by contributors
  - There is no magic set of hidden developers here



# Working on the Pegasus Project



- Working with the Code
  - CVS, snapshots
- Documentation
  - API documentation
  - PEPs
  - Readme documents
- Understand releases & state of Pegasus
  - Nightly build status, bugs, release definition PEPs, ViewCVS, Blocker bug list
- Understanding and future directions
  - Release Definition PEPs
- Contributing Bugs and Corrections
  - OpenPegasus bugzilla
  - Team Reviews
- Contributing New Functionality
  - Define with PEPs
  - Team Review
- Defining future “Requirements”
  - Get Involved

OpenPegasus Nightly Build & Regression Testing Status - Microsoft Internet Explorer provided by Hewlett-Packard

Address: <http://cvs.opengroup.org/cgi-bin/pegasus-build-status.cgi>

### OpenPegasus Nightly Build & Regression Testing Status

#### All Platforms Summary

Note: Not all platforms are currently reporting their nightly build status. The list below should not be viewed as the definitive list of supported platforms. The appearance of a platform in this list does not imply that it is a supported platform.

Platform	Branch	State	Last Message Received		Last Successful Build Message Received	
			Date	Time	Date	Time
<a href="#">EM64T_RHEL4-IA32</a>	MAIN	SUCCESS	<a href="#">051004</a>	0200	<a href="#">051004</a>	0200
<a href="#">EM64T_RHEL4-IA32</a>	RELEASE_2_4-branch	SUCCESS	<a href="#">051004</a>	0250	<a href="#">051004</a>	0250
<a href="#">HP-UX_IPF</a>	MAIN	SUCCESS	<a href="#">051004</a>	0600	<a href="#">051004</a>	0600
<a href="#">HP-UX_IPF</a>	RELEASE_2_4-branch	SUCCESS	<a href="#">051004</a>	0921	<a href="#">051004</a>	0921
<a href="#">HP-UX_PA-RISC</a>	MAIN	SUCCESS	<a href="#">051004</a>	0730	<a href="#">051004</a>	0730
<a href="#">IA32_RHEL3</a>	MAIN	SUCCESS	<a href="#">051004</a>	0200	<a href="#">051004</a>	0200
<a href="#">IA32_RHEL3</a>	RELEASE_2_4-branch	SUCCESS	<a href="#">051004</a>	0251	<a href="#">051004</a>	0251
<a href="#">IA32_RHEL4</a>	MAIN	SUCCESS	<a href="#">051004</a>	0315	<a href="#">051004</a>	0315
<a href="#">IA32_RHEL4</a>	RELEASE_2_4-branch	SUCCESS	<a href="#">051004</a>	0402	<a href="#">051004</a>	0402
<a href="#">IA32_SLES9</a>	MAIN	SUCCESS	<a href="#">051004</a>	0200	<a href="#">051004</a>	0200
<a href="#">IA32_SLES9</a>	RELEASE_2_4-branch	SUCCESS	<a href="#">051004</a>	0255	<a href="#">051004</a>	0255
<a href="#">IA64_RHEL3</a>	MAIN	SUCCESS	<a href="#">051004</a>	0200	<a href="#">051004</a>	0200
<a href="#">IA64_RHEL3</a>	RELEASE_2_4-branch	SUCCESS	<a href="#">051004</a>	0258	<a href="#">051004</a>	0258
<a href="#">IA64_RHEL4</a>	MAIN	SUCCESS	<a href="#">051004</a>	0200	<a href="#">051004</a>	0200
<a href="#">IA64_RHEL4</a>	RELEASE_2_4-branch	SUCCESS	<a href="#">051004</a>	0301	<a href="#">051004</a>	0301

Summary reports and charts

[Log in to an existing account](#)  
[Open a new Bugzilla account](#)

[Add to Sidebar](#) (Requires Mozilla or Netscape 6)

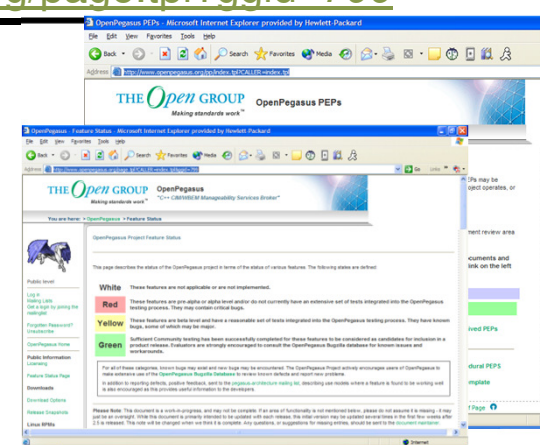
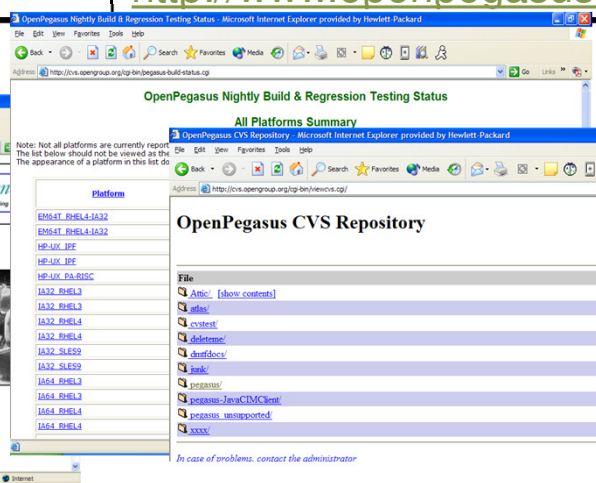
Enter a bug # or some search terms:  
  [\[Help\]](#)

Actions: [Home](#) | [New](#) | [Search](#) |  bug #  | [Reports](#) | [Requests](#) | [New Account](#) | [Log In](#)



# Getting More Information

OpenPegasus Home	<a href="http://www.openpegasus.org">http://www.openpegasus.org</a>
OpenPegasus CVS	<a href="http://cvs.opengroup.org/cgi-bin/viewcvs.cgi/">http://cvs.opengroup.org/cgi-bin/viewcvs.cgi/</a>
OpenPegasus WIKI	<a href="https://wiki.opengroup.org/pegasus-wiki/doku.php">https://wiki.opengroup.org/pegasus-wiki/doku.php</a>
OpenPegasus IRC	<a href="irc://irc.oftc.net/openpegasus">irc://irc.oftc.net/openpegasus</a> (IPV4) <a href="irc://irc6.oftc.net/openpegasus">irc://irc6.oftc.net/openpegasus</a> (IPV6)
OpenPegasus Bugzilla	<a href="http://cvs.opengroup.org/bugzilla/">http://cvs.opengroup.org/bugzilla/</a>
OpenPegasus Build Status	<a href="http://nbat.openpegasus.org">http://nbat.openpegasus.org</a>
OpenPegasus Documentation	<a href="http://www.openpegasus.org/pp/index.tpl">http://www.openpegasus.org/pp/index.tpl</a>
OpenPegasus Email Lists	<a href="http://www.openpegasus.org">http://www.openpegasus.org</a>
OpenPegasus Feature Status	<a href="http://www.openpegasus.org/page.tpl?ggid=799">http://www.openpegasus.org/page.tpl?ggid=799</a>





# Issues List we keep hearing

- **We react/move too slowly**
  - Only through process can we control quality, schedules, etc.
  - Pegasus is a project that must meet user demands and schedules if it is to continue
- **Releases are not frequent enough**
  - Trying to balance of quality releases with reasonable development groups
  - Train release mechanism costs time but imposes quality control
- **Too much process**
  - Without process we don't know where we are or where we are going
- **Pegasus is too:**
  - *Slow, big, incomplete, small, etc.*
    - Continuous a) refactoring, b) performance work, c) new functionality
    - We can only implement what someone commits to do.
- **Pegasus does not do what I want**
  - Things only get done through people that do them (see below)
- **Pegasus not true open source**
  - Work with us. You can contribute. You can vote.
  - Openness takes time
  - The project is completely open (code, discussion, planning, documentation)
- **Somewhere there is a magic set of developers**
  - Effectively a volunteer organization. What you see is what you get



# How we decide what gets done

- Somebody needs it
- Somebody is willing to do it
  - Document the requirement and function
  - Do the code
  - Integrate it
  - Provide test environment
- It is consistent with the project goals
  - Architecture, risk, quality, . . .



# Questions & Discussion

## Now it is your turn



- How do you use Pegasus.?
- What do you use Pegasus for?
- What do you need that is not there?
- What would you need to use Pegasus?

We would like to get your feedback on issues, priorities, users/usage, requests for OpenPegasus.



# Open Management Infrastructure (OMI)

A High-Performance Light-Weight CIM Server

<https://collaboration.opengroup.org/omi>

Michael Brasher

Principal Software Development Engineer, Microsoft

[mikbras@microsoft.com](mailto:mikbras@microsoft.com)

**Microsoft®**

# Open Management Instrumentation Agenda

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- Discuss WBEM standards (briefly).
- Discuss OMI implementation.
- Discuss licensing and distribution.

# What is OMI

## (Open Management Instrumentation)

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- A CIM server implementation.
- Implements key WBEM standards.
- Uses the WS-Management protocol.
- Built for small systems (embedded).
- Portable across Linux/Unix flavors.
- Open-source (Apache 2.0 license).
- Available through The Open-Group.

# Web Based Enterprise Management (WBEM)

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WBEM defines set of DMTF standards for managing systems:

- Meta model** that specifies the rules for defining managed objects.
- Schema** for defining managed objects for specific management domains (e.g., networking and storage).
- Operational model** for defining operations that may be performed on managed objects.
- Protocols** for defining wire protocol realization of the operational model.

# Key WBEM Standards

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- CIM Infrastructure Specification (DSP0004)
- Generic Operations Specification (DSP0223)
- WS-Management
  - Web Services for Management (DSP0226)
  - WS-CIM Mapping Specification (DSP0230)
  - WS-Management CIM Binding Specification (DSP0227)

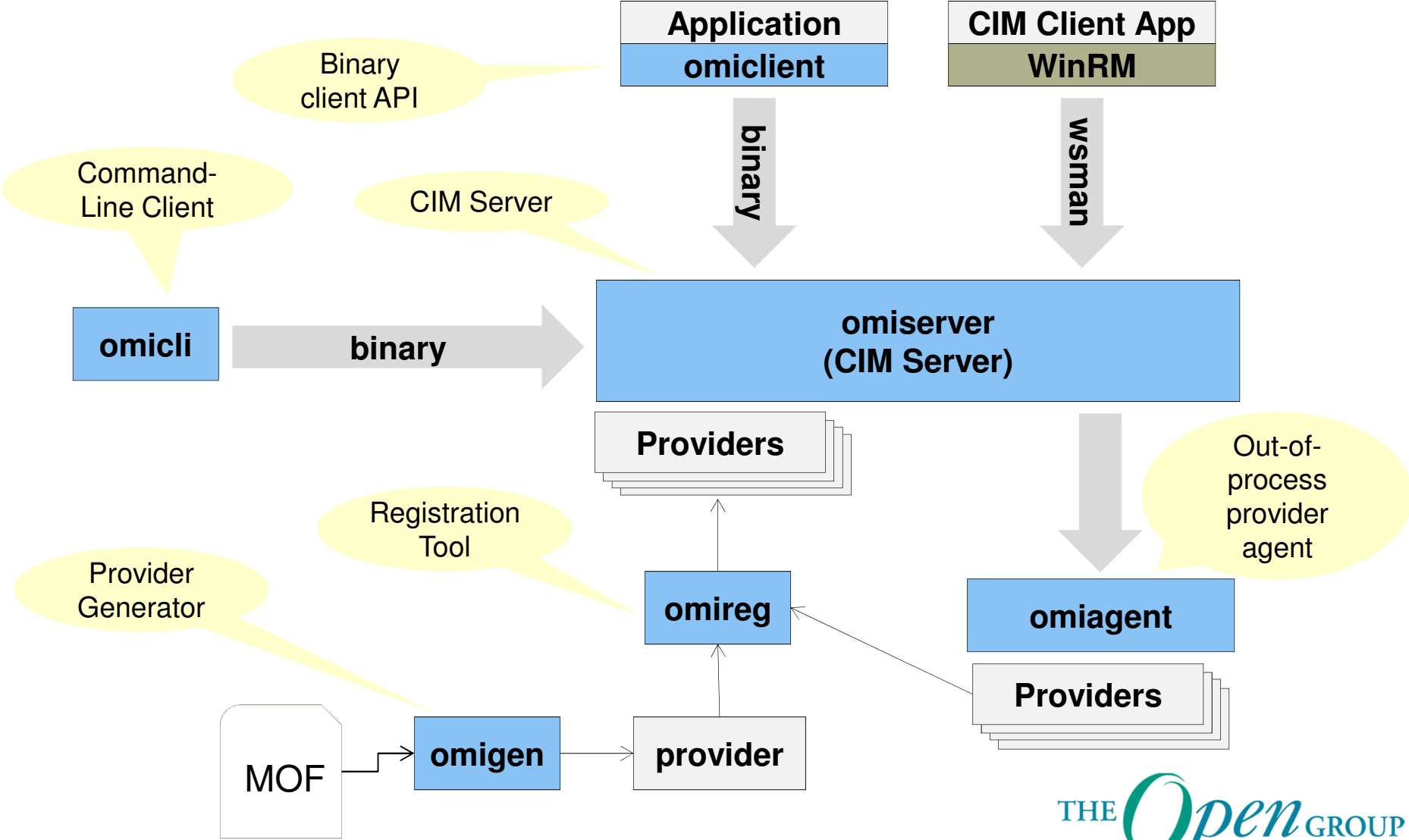
# Keeping it Small

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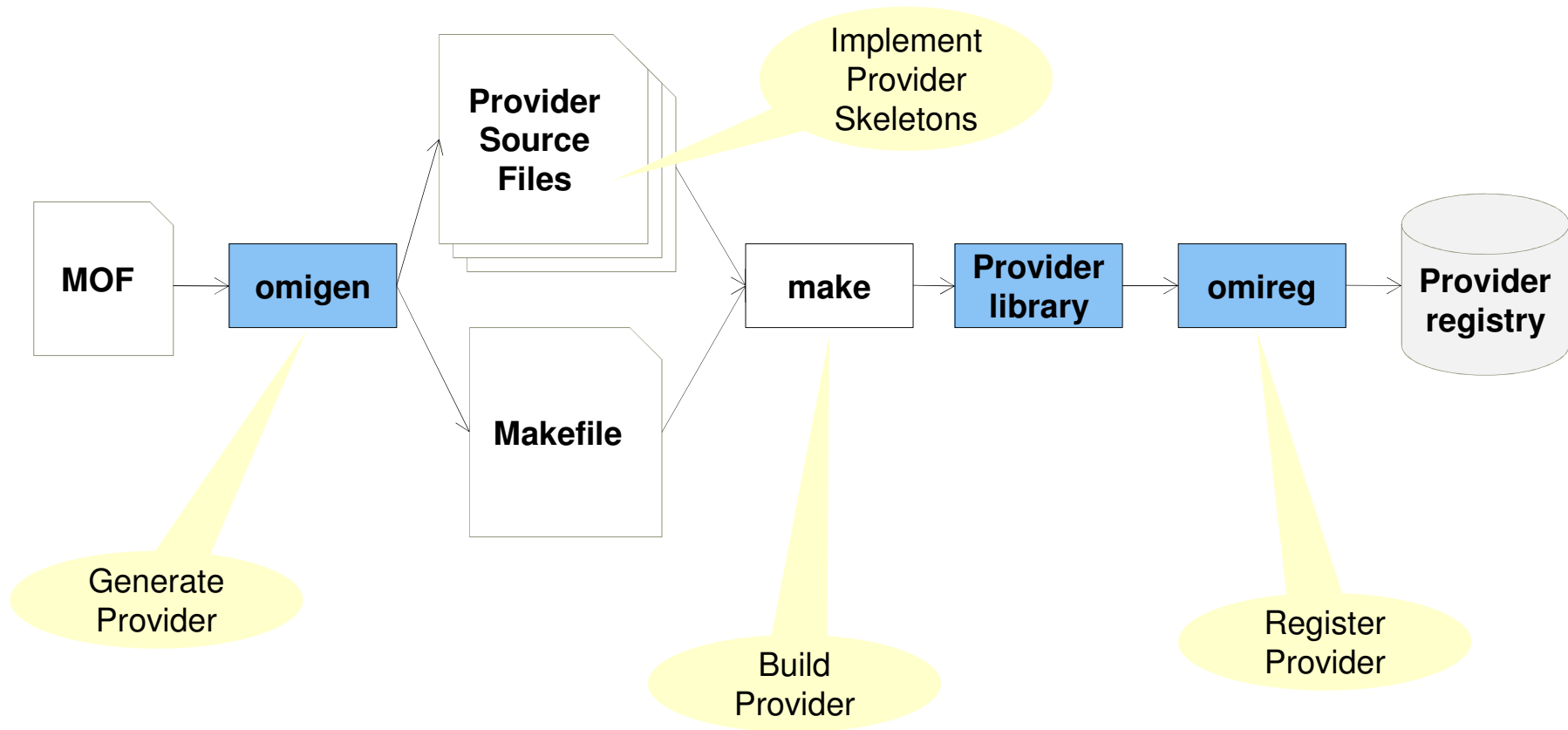
- Server object size is 150 kilobytes\*
- Server implemented in C.
- “Concrete” C provider interface.
- “Repository-less” server.
- Diskless operation.

\*size of omiserver image on 32-bit Linux

# Key OMI Elements



# Provider Development Process





# Provider Development Environment

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- Compatible with WMIv2 provider interface
- Generation of provider skeletons (omigen)
- Generation of concrete CIM classes structures (first-class objects)
- Registration through tool (omireg)

# Dynamic vs. Concrete Provider Development

## Dynamic (CMPI)

```
#include <cmpimac.h>
#include <cmpidt.h>

CMPIInstance* frog;
CMPIStatus st;
CMPIValue v;
CMPIString* str;
...
if (!(frog = CMNewInstance(_cb, cop, &st)) || st.rc != CMPI_RC_OK)
    CMReturn(CMPI_RC_ERR_FAILED);

if (!(str = CMNewString(_cb, "1001", &st)) || st.rc != CMPI_RC_OK)
    CMReturn(CMPI_RC_ERR_FAILED);

v.string = str;
st = CMSetProperty(frog, "Key", &v, CMPI_string);

if (st.rc != CMPI_RC_OK)
    CMReturn(CMPI_RC_ERR_FAILED);

if (!(str = CMNewString(_cb, "Green", &st)) || st.rc != CMPI_RC_OK)
    CMReturn(CMPI_RC_ERR_FAILED);

v.string = str;
st = CMSetProperty(frog, "Color", &v, CMPI_string);

if (st.rc != CMPI_RC_OK)
    CMReturn(CMPI_RC_ERR_FAILED);

v.uint32 = 55;
st = CMSetProperty(frog, "Weight", &v, CMPI_uint32);

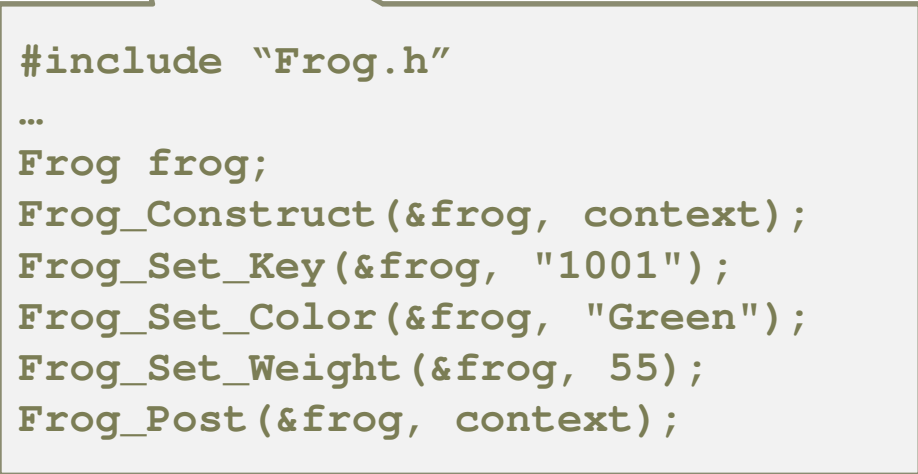
if (st.rc != CMPI_RC_OK)
    CMReturn(CMPI_RC_ERR_FAILED);

st = CMReturnInstance(result, frog);

if (st.rc != CMPI_RC_OK)
    CMReturn(CMPI_RC_ERR_FAILED);
```

## Concrete (OMI)→

```
#include "Frog.h"
...
Frog frog;
Frog_Set_Key(&frog, "1001");
Frog_Set_Color(&frog, "Green");
Frog_Set_Weight(&frog, 55);
Frog_Post(&frog, context);
```



```
#include "Frog.h"
...
Frog frog;
Frog_Construct(&frog, context);
Frog_Set_Key(&frog, "1001");
Frog_Set_Color(&frog, "Green");
Frog_Set_Weight(&frog, 55);
Frog_Post(&frog, context);
```

# Security

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- HTTPS (SSL)
- HTTP Basic Authentication
- Local Authentication
- PAM Authentication
- Out-of-process providers
  - Run as requestor
  - Run as server
  - Run as designated user

# Repository

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- No instance repository
- Immutable in-memory class repository  
(class information supplied by providers)
- Provider registration through flat files (rather than CIM instances)

# Key features not implemented (yet)

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- CMPI (OMI provides alternative)
- CIM-XML Protocol (OMI uses WS-Man)
- CQL (OMI provides WQL)
- Indications (events)
- Instance Repository (eliminated to reduce footprint)

# Licensing & Distribution

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- Apache License, Version 2.0
- Distributed through The Open Group
- Contributors are welcome

See <https://collaboration.opengroup.org/omi>

# Questions & Answers

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