Statistically
1 Year
1000s Of Commits
Parrot Update 2007

8 Releases
4 Hackathons
4 Hackathons

(The fifth one is happening right here, right now, at YAPC::EU::2007!)
1 New Architect
1 New License
1 New Object Model
1 New Bytecode File Format
Ain't Statistics Boring?
87% of people agree!*

* I totally made that number up. Use it for important stuff.
People
Parrot Update 2007

People

- Chip Salzenberg switched from the role of architect to pumpking
- Allison Randal became Parrot architect
- We wanted to move to monthly releases
  - Delegated the release process to a group of six people who will do two releases each a year – one every six months
  - Keeps the load of one person
- We've been doing monthly releases since
The New Object Model
What was wrong with the old one?

- No support for roles – a big feature of the Perl 6 object model
- No introspection (aka reflection)
- Unclear how languages should implement their OO semantics in an interoperable way
- Inheriting from PMCs (classes implemented in C with some extra syntax) didn't really work too well; multiple inheritance just wasn't possible
Roles

- A group of methods and attributes
- Can't be instantiated on its own
- When a class does a role, the methods and attributes from the role are added to that class
- Composition is flattening: if a class tries to do two roles that have a method of the same name, it's an error
- But there are ways to resolve these conflicts
Roles - Implementation

- Added a Role PMC, which you can add methods and attributes to.
- Classes have the `add_role vtable` method, which requests that they compose the role into themselves.
- There is a way to specify a list of methods and attributes to not compose from a role => primitive for conflict resolution (you can implement the Perl 6 in terms of it, but it's more general).
Introspection

- Being able to take a class and find out about it
  - What is it called?
  - What namespace does it belong to?
  - What classes does it inherit from?
  - What roles does it do?
  - What methods does it have?
  - What attributes does it have?
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**Introspection**

- Added inspect opcode

```perl
# Create class named LolCat
$P0 = new 'Class'
$P0.name('LolCat')
# All the introspection data...
$P1 = inspect $P0 # $P1 is Hash of data
# ...or just one item of it.
$P2 = inspect $P0, 'name'
say $P1 # LolCat
```

- Under the hood, it just calls inspect and inspect\_str\_vtable methods
Supporting many different languages

- Parrot isn't just for Perl 6
- Different languages have quite different ways to do object orientation
  - There is no "one true implementation" that fits all of them
- We still want interoperability between different object models
- Solution: define a common interface that object models must implement
Example

- Some languages may allow addition of attributes even after the class has been instantiated.
- In other languages classes are immutable once instantiated.
- But they all allow addition of attributes somehow.
- `add_attribute` is part of the standard interface, but a class system is free to implement it however it wishes.
PMCProxy

- What if you want to do introspection on a PMC?
- When you write a class in PIR, you have an instance of the Class PMC to describe it
- There was no alternative for PMCs
- Added a PMCProxy PMC to describe a PMC
- Yes, it can describe itself 😊
- Implements the same interface as the Class PMC => consistency++, easier code gen.
Inheriting From PMCs

- Now looks just like inheriting from a class
- Use `get_class` opcode to get the PMC's PMCProxy object
- Then add it as a parent to the new class

```
$P0 = get_class 'Hash'
$P1 = new 'Class'
add_parent $P1, $P0
```

- The PMCProxy object sits in the list of parents, just as a Class object would
Inheriting From PMCs – Messy Guts

- Under the hood, quite a bit going on
- PMCs store state in C structures, default high level classes store it in an array
- Need to instantiate the PMCs we are inheriting from and keep them around to provide state storage
- Added a pointer to the PMC data structure to the "real self" so that down-calls would dispatch to any overridden methods
Bytecode File Improvements
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**New Bytecode Header Format**

- Magic number not endian dependent
- Separate the idea of bytecode file format version and Parrot version
  - So Parrot upgrade need not invalidate the bytecode
  - Allow for multiple competing Parrot implementations in the future
- Support for storing UUIDs (User Unique IDs)
- New header format is implemented
Bytecode Annotations

- Need to provide high level language line numbers and file names to produce meaningful errors
- Need to be able to store any other compile time data other languages need, for example all the $? variables in Perl 6
- Bytecode annotations allow any Parrot instruction to be annotated with any key/value pair
- Designed, but not yet implemented
Bytecode PMCs

- At the moment, there is no way to work with bytecode files from within a Parrot program.
- A bunch of PMCs have been specified to allow creation and manipulation of bytecode files from PIR.
- Once implemented, will simplify the internals (less memory management work to do - just let the garbage collector do it for us).
Languages
Now passes all of the sanity tests! 😊

Running a slightly cut down version of the Perl 6 test harness

Script to import some of the tests from the Pugs repository - we pass some of those too

Basic expressions, scalars, arrays, hashes, method calls, arity-based multisubs, quoted terms, ranges (non-lazy), try blocks, $!, regexes, binding, listops, if and unless statements, chained operators and more!
Other Languages With Activity This Year

- APL
- BASIC
- ECMAScript
- Forth
- LISP
- Lua
- ParTcl (Tcl implementation)
Other Languages With Activity This Year

- Plumhead (PHP implementation)
- Pynine (Python implementation)
- Pheme (Scheme implementation)
- WMLScript
Compiler Tools
Parrot Compiler Toolkit

- Parrot Compiler Toolkit is the new name for Parrot's suite of compiler tools
- PGE = Parrot Grammar Engine
- TGE = Tree Grammar Engine
- PAST = Parrot Abstract Syntax Tree
- POST = Parrot Opcode Syntax Tree
- HLLCompiler = PMC that manages the compilation process and provides a standard interface
NQP

- NQP = Not Quite Perl
- Writing tree transforms in PIR takes quite a bit of effort, and is often a lot of code
- Now we can write them in NQP, which gets compiled down to PIR
- It's somewhat like a very limited Perl 6
Odds And Ends
Other Things That Deserve A Mention

- Much work has been done implementing "seat belts" – things that help us avoid writing bad code

- Much work has been done on portability, thanks to a microgrant; a side-effect of this is we can now built Parrot on C++ compilers too

- Loads of leaks plugged, bugs fixed, tests added – and a few performance improvements too
Final Thoughts
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Optimism!

- It's been a good year for Parrot
- Several key bits of design that were missing or under-specified are now in good shape
- New object model unblocks things, including some languages
- Code base is in much better shape thanks to a focus on coding standards, as well as automated testing of adherence
- Importantly, lots of people are having fun!
Thank You!
Questions?