



# What's new in EpochX 1.1?

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## We're a framework, yay!

We now consider EpochX to be a framework rather than an API. That is a slight shift in thinking rather than anything different with the software, but it means we will look to provide as much of the work for free as possible with sensible defaults and a structured approach, while still offering the extensibility that is necessary.

## 3 algorithms in 1

We have separated the evolutionary algorithm from the representation. This means it has been possible to merge the XGE system for doing Grammatical Evolution into EpochX, and also added support for Whigham's grammar approach. Because of this separation, it is entirely possible to add an extension to support any other evolutionary algorithm representation, including genetic algorithms. Built in support for other representations may come in the future.

We refer to the 3 libraries as XGP (for tree GP), XGR (for Whigham's context free grammar GP) and XGE (for Grammatical Evolution). But, they're all just parts of the one framework – EpochX.

## Fitness caching

Earlier versions of EpochX were a little bit dumb in handling fitness evaluation, every time the fitness of a program was requested it had to be calculated. In version 1.1 a program is only re-evaluated if the program has changed. Fitness caching can of course be turned off, because there may be cases when you wish the fitness of a program to not be so tightly tied to its source.

## Statistics for all

It used to be the case that you would request statistics by using a complicated listener model. Now you simply get or print statistics by directly calling methods on the StatsManager class. These method calls can be very powerfully combined with the Life Cycle system to access statistics each generation or each crossover even.

## The circle of life

EpochX's event handling system, which we refer to as the Life Cycle system, has been expanded to provide many more events that can be listened for. Also, helpfully, the addition of Adapters which are Abstract default implementations of the listeners, mean you can listen to one event without having to listen to all the others.