Formal methods are taking your program and finding a way to represent its execution as mathematical formulas or objects. You then perform mathematical or logical operations on these objects to analyze and specify how your program behaves and operates. Due to the rigor and time it takes to perform these formal methods, many tools have emerged that perform these operations for you. Cadence Design Systems, Inc. is one of many companies that produce these tools. Their latest release of Jasper RTL Apps leverages machine learning technology and core formal technology to address the problem of larger and more complex System on Chip designs with the overall goal of increasing the speed of verification. [1]

We will take a closer look at a specific app on this platform known as Jasper FPV or Formal Property Verification. This application is ideal for early stages of debugging and performing full proofs to verify that how the system behaves matches up with its intended behaviors. [2] The human interface or GUI is fully scalable from smaller designs to larger designs with efficiency and ease-of-use in mind. Many benefits of this app such as, workflow design, low memory consumption and high-performance engines contribute to the scalability, efficiency, and easy-to-use interface. [2] This application also contains a wall clock which allows its users to easily view the elapsed time from the start of a program to the end. [2]

Jasper FPV can validate block-level properties and high-level requirements. It can also perform validation on some properties in parallel. The machine learning capability of Jasper RTL Apps allows first-time proofs to be performed much faster by selecting and parameterizing solutions, as well as optimizing successive runs for regression testing whether on the cloud or not. [1] The Smart Proof Technology that provides the machine learning has delivered an increase in proof performance by as much as 4 times what it was before. The speed-up in performance with regards to regression testing has been proven to be as much as 6 times. [1]

The strengths associated with using Jasper RTL apps also become their weakness. With such an increase in verification and proofs, enhanced scalability and usability, and low memory usage, it only makes sense that it will be costly. All Jasper RTL apps also require specific licensing to use. Luckily, Cadence also provides the required training and licensing.

This app also provides a unique feature for analyzing any “What if?” scenarios by using the Jasper Visualize Interactive Debug Environment and QuietTrace debugging capabilities which allows for rapid debugging. Constraints and modifications can also be added in last minute situations such as when a counterexample is found. [2] QuietTrace also provides the user with the minimal amount of activity needed to perform the desired or intended behavior. This makes Jasper FPV ideal for early-stage debugging, deep bug hunting, delivering high levels of confidence and performing early-stage proofs for comparing the systems behavior with its intended behaviors. [2] I would only recommend Jasper FPV for use on complex or safety-critical applications or projects where the cost to utilize this application can be rationalized.

A case can be made for Jasper FPV to be used in Agile. Particularly, in the stages of testing and requirements. A software engineer can utilize this app any time changes are made or rolled back to the project to support high-performance regression testing and filtering out any parts of the project that don’t support or contradict the initial requirements. Jasper FPV will also find any constraints or cases we may have not considered that could cause the build to fail after deployment.

**References:**

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