**Microsoft Makes rDSN Open Source**

Developed by System Research Group of [Microsoft Research Asia](http://www.msra.cn/zh-cn/default.aspx), Robust Distributed System Nucleus (rDSN), is now open source on [GitHub.com](https://github.com/). rDSN is an open framework for developers, students, and researchers to quickly build and manage high-performance and robust distributed systems, which is critical for the success of many emerging technologies today such as cloud computing, big data, and IoT (Internet of Things).

The idea of this framework arises during the team's past efforts to (semi-) automatically test, debug, optimize, operate, scale, replicate, compose, and even reason the given distributed systems. A lot of challenges were encountered in those projects, and most are due to the fact that the initial programming does not consider these goals at all, which results later work difficult or even infeasible.

rDSN provides a coherent framework where developers build their systems almost as usual, while the code is conform to certain principles, and can be upgraded later with little or no cost for achieving the above goals. An early version of rDSN has been used in Bing for building a distributed data service, and the system has been online and running well. With feedbacks from the production teams, rDSN is improved and now made public through open sourcing, trying to benefit the community especially developers, students, and researchers who are working on distributed systems in various ways.

Following are some examples for different roles (a tutorial is given for trying); note their usage are not restricted by these roles.

**For developers**, rDSN enhances development and management experience for system programmability, performance, and robustness. As its simplest form, rDSN can be used as an enhanced RPC library compatible to many others (e.g., Apache Thrift), or a task library where event-driven programming is adopted for high throughput. Developers can also configure rDSN into “test” mode, which tests the systems against various failures and scheduling decisions systematically, exposing early the possible bugs. Once a bug is exposed, you can switch to a “debug” mode to reproduce it, with all nodes' state in a same process and debugging without worrying about any false timeouts. When it is online, rDSN provides automatic flow tracing and performance monitoring. If you are not satisfied with the default libraries in rDSN and want to use your own (e.g., logging or networking library), rDSN is open and you can easily integrate them. Even further, when you need to scale your service and make it reliable, rDSN replicates it with minor further development cost. In summary, rDSN provides and allows tools/frameworks to be seamlessly integrated with your system for good, which greatly improves the efficiency of system development and management.

**For students**, rDSN provides a platform where you can easily simplify, understand and manipulate a distributed system. When learning distributed protocols, you can easily implement one atop of rDSN, and test it on its simulator. The simulator can abstract away many practical difficulties initially, and you can add them back gradually to evolve your protocol, such as from single-thread to multiple-thread, from constant message delay to variant ones, even with message lost. To understand the running protocol, rDSN provides flow tracing and generates a so-called “event matrix” which records the invocation count among different events, revealing the dependencies with weight inside the system. Furthermore, you can easily replace a low component to see what happens.

**Researchers** usually want to find and build something common to many distributed systems, such as runtime policies and diagnosis tools. rDSN provides a dedicated Tool API for that purpose. The API provides virtualization of all low level components, and exposes all non-deterministic behaviors from the upper applications at the event granularity. With this API, it is much easier to build reliable and effective runtime tools and/or policies. The current release contains a handful set of examples. Even better, rDSN ensures that those tools can always be seamlessly integrated with the upper applications - a big bonus for the research work to make real impact.

With all these possible benefits, it is hoped that the community can together build better distributed systems easily, by not only adopting rDSN, but also contributing back whatever built with rDSN to help the others. Visit the project now at <https://github.com/Microsoft/rDSN>.