CLAIMS

1. A process-level troubleshooting architecture configured to facilitate substrate processing in a plasma processing system, comprising:

a process module controller configured to control operation of the plasma processing system, the process module controller further configured to collect and provide first data, wherein the first data corresponds to chamber event data associated with the plasma processing system;

a plurality of sensors, wherein first sensors of said plurality of sensors collect second data from said process module controller, wherein the second data corresponds to sensed data about process parameters of said process module controller sensed by said first sensors, wherein said first sensors transmit said sensed data directly to said process module controller without preprocessing by a computing module; and

a process-module-level analysis server that is located remotely from the process module controller and the plurality of sensors, wherein said process-module-level analysis server communicates directly with said first sensors and said process module controller, wherein said first sensors transmit said second data collected from said process module controller directly to said process-module-level analysis server in real-time, and wherein said process-module-level analysis server is configured for

receiving data, wherein said data includes (i) said second data from said first sensors and (ii) said first data from said process module controller, and wherein said second data and said first data are separately received by said process-module-level analysis server from said first sensors and said process module controller, respectively,

analyzing said received data, and

sending interdiction data directly to said process module controller when a problem associated with operation of the process module controller is identified during said substrate processing, wherein said process-module-level analysis server is configured to identify said problem based on said first data received from said process module controller and said second data collected from said process module controller by said first sensors.

2. The process-level troubleshooting architecture of claim 1 wherein a second sensor of said plurality of sensors includes a computing module for performing preprocessing and packetizing of said sensed data before sending at least a portion of said second data to said process-module-level analysis server.

3. The process-level troubleshooting architecture of claim 2 wherein said process-module-level analysis server includes an Ethernet switch, wherein said Ethernet switch enables said process-module-level analysis server to communicate with said second sensor.

4. The process-level troubleshooting architecture of claim 1 wherein at least one of said first sensors converts said second data from an analog format to a digital format before sending said second data directly to said process-module-level analysis server.

5. The process-level troubleshooting architecture of claim 1 wherein said process-module-level analysis server includes a data converter for converting from an analog format into a digital format said second data sent by at least one of said first sensors.

6. A process-level troubleshooting architecture configured to facilitate substrate processing in a plasma processing system, comprising:

a process module controller configured to control operation of the plasma processing system, the process module controller further configured to collect and provide first data, wherein the first data corresponds to chamber event data associated with the plasma processing system;

a plurality of sensors, wherein first sensors of said plurality of sensors collect second data from said process module controller, wherein said second data corresponds to sensed data about process parameters of said process module controller sensed by said first sensors, wherein said first sensors transmit said sensed data directly to said process module controller without preprocessing by a computing module; and

a process-module-level analysis server that is located remotely from the process module controller and the plurality of sensors, wherein said process-module-level analysis server communicates directly with said first sensors and said process module controller, wherein said first sensors transmit said sensed data collected from said process module controller directly to said process-module-level analysis server in real-time, and wherein said process-module-level analysis server is configured for

receiving data, wherein said received data includes (i) said second data from said first sensors and (ii) said first data from said process module controller, and wherein said second data and said first data are separately received by said process-module-level analysis server from said first sensors and said process module controller, respectively,

analyzing said received data, and

sending interdiction data directly to said process module controller when a problem associated with operation of the process module controller is identified during said substrate processing, wherein said process-module-level analysis server is configured to identify said problem based on said first data received from said process module controller and said second data collected from said process module controller by said first sensors;

wherein said process-module-level analysis server includes a shared memory backbone, wherein said shared memory backbone is accessed by a plurality of processors, wherein each processor of said plurality of processors is configured at least for interacting with one sensor of said plurality of sensors through said shared memory backbone.

7. The process-level troubleshooting architecture of claim 6 wherein said shared memory backbone is configured to perform load balancing among said plurality of processors.

8. The process-level troubleshooting architecture of claim 7 wherein said shared memory backbone is configured to provide fault tolerance among said plurality of processors.

9. The process-level troubleshooting architecture of claim 6 wherein at least one processor of said plurality of processors is a secondary processor, wherein said secondary processor is configured at least for receiving said second data from at least one sensor of said plurality of sensors and for processing said second data.

10. The process-level troubleshooting architecture of claim 9 wherein at least one processor of said plurality of processors is a primary processor, wherein said primary processor is configured at least for performing one of

receiving said first data from said process module controller,

receiving said second data from at least one sensor of said plurality of sensors, correlating said first data with said second data, and

sending substantially real-time interdiction data to said process module controller via a direct digital output line.

11. A system configured to perform evaluation during substrate processing in a plasma processing system, comprising:

a plurality of processors for processing data, wherein said data includes (i) sensed data collected by and received from a plurality of sensors in real-time and (ii) chamber event data collected by a process module controller, wherein the sensed data corresponds to data about processing parameters of said process module controller sensed by said plurality of sensors, and wherein said sensed data and said chamber event data are separately received by said plurality of processors from said plurality of sensors and said process module controller, respectively,

wherein said system is located remotely from and is coupled directly to said process module controller and said plurality of sensors, and wherein first sensors of said plurality of sensors transmit said sensed data directly to said system without preprocessing by a computing module;

wherein said processing includes at least one of

receiving said sensed data,

analyzing said sensed data,

performing data correlation on said sensed data, and

sending interdiction data to said process module controller when a problem associated with operation of the process module controller is identified, wherein said system is configured to identify said problem based on said chamber event data received from said process module controller and said sensed data collected from said process module controller by said plurality of sensors;

a shared memory backbone, wherein said shared memory backbone is accessed by said plurality of processors;

a network interface, wherein said network interface is configured at least for receiving said sensed data; and

a direct digital output line, wherein said direct digital output line is a communication path between said plurality of processors and said process module controller.

12. The system of claim 11 wherein said network interface is configured for receiving sensed data from a second sensor of said plurality of sensors, wherein said second sensor includes a computing module for performing preprocessing before sending at least a portion of said sensed data to said plurality of processors via said network interface.

13. The system of claim 12 wherein said network interface is an Ethernet switch.

14. The system of claim 11 wherein at least one of said first sensors includes a data converter for converting said sensed data from an analog format into a digital format before sending at least a portion of said sensed data to said plurality of processors.

15. The system of claim 14 wherein said data converter is field-programmable gate array (FPGA).

16. The system of claim 11 wherein said shared memory backbone is configured to perform load balancing among said plurality of processors.

17. The system of claim 11 wherein said shared memory backbone is configured to provide fault tolerance among said plurality of processors.

18. The system of claim 11 wherein each processor of said plurality of processors is configured for communicating directly with at least one sensor of said plurality of sensors.

19. The system of claim 18 wherein at least one processor of said plurality of processors is a secondary processor, wherein said secondary processor is configured at least for receiving sensed data from at least one sensor of said plurality of sensors and to process said sensed data.

20. The system of claim 19 wherein at least one processor of said plurality of processors is a primary processor, wherein said primary processor is configured at least for performing one of

receiving said process module and chamber data from said process module controller,

receiving said sensed data from at least one sensor of said plurality of sensors,

correlating said sensed data and said chamber event data, and

sending said interdiction data to said process module controller via a direct digital output line.