Project Reviewed	**GeoJson Parser** (written by Team E)
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Subject	Secure Coding Principles and Practices (PA 193)

GeoJSON is an open standard format for encoding collections of simple geographical features along with their non-spatial attributes using JavaScript Object Notation. The features include :

- points (addresses/locations)
- line strings (streets/highways)
- polygons (countries/provinces) and multi-part collections of these types

GeoJSON feature need not represent entities of physical world only;
E.g mobile routing and navigation apps describe their service coverage using GeoJSON.
Unlike GIS Standards which is written and maintained by formal standards oraganization, GeoJSON is maintained by an *Internet working group of developers*. GeoJson specification available http://geojson.org/geojson-spec.html (parts 2.1.2, 2.1.3, 2.1.4, 2.1.5, 2.1.6 and 2.1.7)
A notable offspring of GeoJSON is TopoJSON, an extension of GeoJSON that encodes geospatial topology and that typically provides smaller file sizes.

GeoJSON Parser	**Supported types** - *Point, MultiPoint, LineString, MultiLineString, Polygon, MultiPolygon*
	Target Platform - *Windows 8.1, compiled using Visual Studio 2012 ,Language: C++11*
	Dependencies - *STD library, Boost library*
	Input - *Input GeoJson format file. E.g. { "type": "Point", "coordinates": [2, 0] }*
	Output - *File parsed correctly (if format is correct)* *Otherwise Error: Message*

Manual Review	**Code compilation** - *Compiled & Run successfully, need Boost library path to be included*
	Code commenting - *Inline, Descriptive, Function/Class comments missing*
	Sanity checks - *Input Sanity Checks are not exhaustive*
	Limited format - *Covers only 6 objects, Specifications has many more. Moreover, Geojson format specifications(RFC 4627), says Object is an unordered set of name/value pairs, but the program considers fixed order of the values in the file*
	'GeometryType' cases - *Enumerators GEOMETRYCOLLECTION, FEATURE, FEATURECOLLECTION, GEOMETRY_TYPE_COUNT not handled*
	Coding conventions - *Conventions like Variable naming could have added for better code readability*
	Size of File Name - *char filenametemp[65536] ? (Windows limits file names to 260 chars)*

	GetOpenFileName(&ofn) Return value not checked
	(http://msdn.microsoft.com/en-us/library/windows/desktop/ms646839%28v= vs.85%29.aspx)
	Line 582 : g_mData.reserve(MEMORY_ARRAY_SIZE); Can throw an exception
	Line 727 : (*leaf).mData = new int(g_mData.size());
	Line 726 : Node* leaf = new Node(node, elementName, Type::ARRAY);
	Line 768 : (*leaf).mData = new string(tokens[i].substr(1, tokens[i].length() - 2));
	Line 767 : Node* leaf = new Node(node, elementName, Type::STRING);
	Line 690 L root = new Node()

Program crashed for following Inputs

1. Empty Input file with .json extension
2. Improper format checking
   a. { "type": "MultiLineString",
   "coordinates": [[100.0, 0.0], [101.0, 1.0]] [100.0, 0.0], [101.0, 1.0] }
   b. { "type": "MultiPoint", "coordinates": [[100.0, 0.0]] [[101.0, 1.0]] }

Valid Input rejection	**Input**	**Output**
	{ "type": "Point", "coordinates": [2, 0] }, { "type": "Point", "coordinates": [2, 0] }	Error: Invalid format File not parsed
Invalid Input Acceptance	{ "type" |:| "Point", "coordinates": [100.0, 0.5] }	File parsed correctly. Press return to exit...

Output of analysis using Automated Tools	
PREFast	1. main.cpp(72): warning C4820: 'Array' : '3' bytes padding added after data member 'Array::mIsPointer' 2. main.cpp(35): warning C4265: '_Node' : class has virtual functions, but destructor is not virtual instances of this class may not be destructed correctly *(line no. 66,80 also has similar warnings)* 3. main.cpp(102): warning C4365: 'argument' : conversion from 'int' to 'unsigned int',signed/unsigned mismatch *(Total 33 instances of similar class of warnings found at different line numbers)* 4. main.cpp(726): warning C4365: 'initializing' : conversion from 'unsigned int' to 'int', signed/unsigned mismatch 5. main.cpp(805): warning C4571: Informational: catch(...) semantics changed since Visual C++ 7.1; structured exceptions (SEH) are no longer caught 6. main.cpp(945): warning C4061: enumerator 'GEOMETRY_TYPE_COUNT' in switch of enum 'GeometryType' is not explicitly handled by a case label 7. main.cpp(945): warning C4061: enumerator 'FEATURECOLLECTION' in switch of enum 'GeometryType' is not explicitly handled by a case label 8. main.cpp(945): warning C4061: enumerator 'FEATURE' in switch of enum 'GeometryType' is not explicitly handled by a case label 9. main.cpp(945): warning C4061: enumerator 'GEOMETRYCOLLECTION' in switch of enum 'GeometryType' is not explicitly handled by a case label 10. main.cpp(542): warning C4100: 'envp' : unreferenced formal parameter (similar warnings for argc and argv)
	Specific Warnings(by Code Analysis) 1. *C6262 Excessive stack usage-* Function uses '66208' bytes of stack: exceeds /analyze: stacksize '16384'. Consider moving some data to heap. Parser - main.cpp (Line 542) 2. *C28182 Dereferencing a copy of a null pointer-* Dereferencing NULL pointer. 'parent' contains the same NULL value as 'node->mParent' did. Line 185: 'parent' may be NULL Line 187: 'parent' is dereferenced, but may still be NULL **Parser** - main.cpp (Line 187)
CPPCheck	1. [Parser\main.cpp:199]: (style) C-style pointer casting 2. *(Total 11 instances of similar class of warnings found at different line numbers)* 3. [Parser\main.cpp:674]: (style) Scope of the variable 'node' can be reduced. 4. [Parser\main.cpp:676]: (style) Scope of the variable 'previous' can be reduced. 5. [Parser\main.cpp:678]: (style) Scope of the variable 'bColonFlag' can be reduced. 6. [Parser\main.cpp:679]: (style) Scope of the variable 'nColonCnt' can be reduced 7. [Parser\main.cpp:796]: (style) Variable 'bColonFlag' is assigned a value that is never used. 8. [Parser\main.cpp:47]: (performance) Variable 'mLeftSide' is assigned in constructor body. Consider performing initialization in initialization list.