

<b>FOREWORD.....</b>	<b>VII</b>
<b>INTRODUCTION.....</b>	<b>VIII</b>
<b>1. SCOPE .....</b>	<b>1</b>
<b>2. NORMATIVE REFERENCES.....</b>	<b>1</b>
<b>3. TERMS AND DEFINITIONS, SYMBOLS AND CONVENTIONS .....</b>	<b>1</b>
3.1 TERMS AND DEFINITIONS .....	1
3.2 SYMBOLS AND CONVENTIONS.....	5
<b>4. BASIC CONCEPTS .....</b>	<b>6</b>
4.1 PURPOSE OF THIS TECHNICAL REPORT .....	6
4.2 INTENDED AUDIENCE .....	6
4.3 HOW TO USE THIS DOCUMENT.....	7
<b>5 VULNERABILITY ISSUES AND GENERAL AVOIDANCE MECHANISMS.....</b>	<b>8</b>
5.1 PREDICTABLE EXECUTION.....	8
5.2 SOURCES OF UNPREDICTABILITY IN LANGUAGE SPECIFICATION .....	9
5.2.1 INCOMPLETE OR EVOLVING SPECIFICATION.....	9
5.2.2 UNDEFINED BEHAVIOUR.....	10
5.2.3 UNSPECIFIED BEHAVIOUR .....	10
5.2.4 IMPLEMENTATION-DEFINED BEHAVIOUR .....	10
5.2.5 DIFFICULT FEATURES.....	10
5.2.6 INADEQUATE LANGUAGE SUPPORT .....	10
5.3 SOURCES OF UNPREDICTABILITY IN LANGUAGE USAGE.....	10
5.3.1 PORTING AND INTEROPERATION .....	10
5.3.2 COMPILER SELECTION AND USAGE.....	11
5.4 TOP AVOIDANCE MECHANISMS (GUIDANCE?).....	11
<b>6. PROGRAMMING LANGUAGE VULNERABILITIES .....</b>	<b>13</b>
6.1 GENERAL .....	13
6.2 TYPE SYSTEM [IHN] .....	14
6.3 BIT REPRESENTATIONS [STR] .....	16
6.4 FLOATING-POINT ARITHMETIC [PLF] .....	18
6.5 ENUMERATOR ISSUES [CCB] .....	21
6.6 CONVERSION ERRORS [FLC] .....	23
6.7 STRING TERMINATION [CJM].....	25
6.8 BUFFER BOUNDARY VIOLATION (BUFFER OVERFLOW) [HCB] .....	26
6.9 UNCHECKED ARRAY INDEXING [XYZ].....	28
6.10 UNCHECKED ARRAY COPYING [XYW] .....	30
6.11 POINTER TYPE CONVERSIONS [HFC] .....	31
6.12 POINTER ARITHMETIC [RVG] .....	32
6.13 NULL POINTER DEREFERENCE [XYH] .....	33
6.14 DANGLING REFERENCE TO HEAP [XYK].....	34
6.15 ARITHMETIC WRAP-AROUND ERROR [FIF] .....	36
6.16 USING SHIFT OPERATIONS FOR MULTIPLICATION AND DIVISION [PIK].....	38
6.17 CHOICE OF CLEAR NAMES [NAI].....	39
6.18 DEAD STORE [WXQ].....	41
6.19 UNUSED VARIABLE [YZS] .....	42
6.20 IDENTIFIER NAME REUSE [YOW].....	43

6.21 NAMESPACE ISSUES [BJL].....	45
6.22 INITIALIZATION OF VARIABLES [LAV] .....	47
6.23 OPERATOR PRECEDENCE AND ASSOCIATIVITY [JCW] .....	49
6.24 SIDE-EFFECTS AND ORDER OF EVALUATION OF OPERANDS [SAM] .....	50
6.25 LIKELY INCORRECT EXPRESSION [KOA].....	52
6.26 DEAD AND DEACTIVATED CODE [XYQ] .....	54
6.27 SWITCH STATEMENTS AND STATIC ANALYSIS [CLL] .....	56
6.28 DEMARCTION OF CONTROL FLOW [EOJ] .....	57
6.29 LOOP CONTROL VARIABLES [TEX].....	59
6.30 OFF-BY-ONE ERROR [XZH] .....	60
6.31 STRUCTURED PROGRAMMING [EWD] .....	61
6.32 PASSING PARAMETERS AND RETURN VALUES [CSJ].....	63
6.33 DANGLING REFERENCES TO STACK FRAMES [DCM] .....	65
6.34 SUBPROGRAM SIGNATURE MISMATCH [OTR].....	67
6.35 RECURSION [GDL] .....	69
6.36 IGNORED ERROR STATUS AND UNHANDLED EXCEPTIONS [OYB].....	70
6.37 TYPE-BREAKING REINTERPRETATION OF DATA [AMV].....	72
6.38 DEEP VS. SHALLOW COPYING [YAN] .....	74
6.39 MEMORY LEAKS AND HEAP FRAGMENTATION [XYL] .....	76
6.40 TEMPLATES AND GENERICS [SYM].....	77
6.41 INHERITANCE [RIP] .....	79
6.42 VIOLATIONS OF THE LISKOV SUBSTITUTION PRINCIPLE OR THE CONTRACT MODEL [BLP].....	81
6.43 REDISPATCHING [PPH] .....	83
6.44 POLYMORPHIC VARIABLES [BKK] .....	85
6.45 EXTRA INTRINSICS [LRM] .....	87
6.46 ARGUMENT PASSING TO LIBRARY FUNCTIONS [TRJ].....	88
6.47 INTER-LANGUAGE CALLING [DJS].....	89
6.48 DYNAMICALLY-LINKED CODE AND SELF-MODIFYING CODE [NYY] .....	91
6.49 LIBRARY SIGNATURE [NSQ] .....	92
6.50 UNANTICIPATED EXCEPTIONS FROM LIBRARY ROUTINES [HJW] .....	93
6.51 PRE-PROCESSOR DIRECTIVES [NMP] .....	94
6.52 SUPPRESSION OF LANGUAGE-DEFINED RUN-TIME CHECKING [MXB].....	96
6.53 PROVISION OF INHERENTLY UNSAFE OPERATIONS [SKL] .....	97
6.54 OBSCURE LANGUAGE FEATURES [BRS] .....	98
6.55 UNSPECIFIED BEHAVIOUR [BQF] .....	100
6.56 UNDEFINED BEHAVIOUR [EWF] .....	101
6.57 IMPLEMENTATION-DEFINED BEHAVIOUR [FAB].....	103
6.58 DEPRECATED LANGUAGE FEATURES [MEM].....	105
6.59 CONCURRENCY – ACTIVATION [CGA] .....	106
6.60 CONCURRENCY – DIRECTED TERMINATION [CGT].....	108
6.61 CONCURRENT DATA ACCESS [CGX].....	109
6.62 CONCURRENCY – PREMATURE TERMINATION [CGS] .....	111
6.63 PROTOCOL LOCK ERRORS [CGM] .....	113
6.64 RELIANCE ON EXTERNAL FORMAT STRING [SHL].....	115
<b>7. APPLICATION VULNERABILITIES.....</b>	<b>117</b>
7.1 GENERAL .....	117
7.2 UNRESTRICTED FILE UPLOAD [CBF] .....	117
7.3 DOWNLOAD OF CODE WITHOUT INTEGRITY CHECK [DLB] .....	118
7.4 INCLUSION OF FUNCTIONALITY FROM UNTRUSTED CONTROL SPHERE [DHU] .....	119

7.5 URL REDIRECTION TO UNTRUSTED SITE ('OPEN REDIRECT') [PYQ] .....	120
7.6 USE OF UNCHECKED DATA FROM AN UNCONTROLLED OR TAINTED SOURCE [EFS] .....	121
7.7 CROSS-SITE SCRIPTING [XYT] .....	122
7.8 ADHERENCE TO LEAST PRIVILEGE [YXN] .....	124
7.9 PRIVILEGE SANDBOX ISSUES [XYO] .....	125
7.10 EXECUTING OR LOADING UNTRUSTED CODE [XYS] .....	126
7.11 MISSING REQUIRED CRYPTOGRAPHIC STEP [XZS] .....	127
7.12 INSUFFICIENTLY PROTECTED CREDENTIALS [XYM] .....	128
7.13 MISSING OR INCONSISTENT ACCESS CONTROL [XZN] .....	129
7.14 AUTHENTICATION LOGIC ERROR [XZO].....	129
7.15 HARD-CODED PASSWORD [XYP] .....	131
7.16 SENSITIVE INFORMATION UNCLEARED BEFORE USE [XZK] .....	132
7.17 IMPROPERLY VERIFIED SIGNATURE [XZR].....	133
7.18 USE OF A ONE-WAY HASH WITHOUT A SALT [MVX].....	134
7.19 INADEQUATELY SECURE COMMUNICATION OF SHARED RESOURCES [CGY] .....	134
7.20 MEMORY LOCKING [ZXZ] .....	136
7.21 RESOURCE EXHAUSTION [XZP].....	137
7.22 TIME CONSUMPTION MEASUREMENT [CCM].....	138
7.23 INCORRECT AUTHORIZATION [BJE] .....	139
7.24 IMPROPER RESTRICTION OF EXCESSIVE AUTHENTICATION ATTEMPTS [WPL] .....	140
7.25 UNSPECIFIED FUNCTIONALITY [BVQ] .....	140
7.26 FAULT TOLERANCE AND FAILURE STRATEGIES [REU].....	141
7.27 DISTINGUISHED VALUES IN DATA TYPES [KLK] .....	144
7.28 RESOURCE NAMES [HTS] .....	146
7.29 INJECTION [RST].....	147
7.30 UNQUOTED SEARCH PATH OR ELEMENT [XZQ].....	150
7.31 DISCREPANCY INFORMATION LEAK [XZL] .....	151
7.32 PATH TRAVERSAL [EWR] .....	152
7.33 CLOCK ISSUES [CCI] .....	154
7.34 TIME DRIFT AND JITTER [CDJ].....	156
<b>ANNEX A (INFORMATIVE) VULNERABILITY TAXONOMY AND LIST .....</b>	<b>158</b>
A.1 GENERAL.....	158
A.2 OUTLINE OF PROGRAMMING LANGUAGE VULNERABILITIES .....	158
A.3 OUTLINE OF APPLICATION VULNERABILITIES .....	160
A.4 VULNERABILITY LIST .....	161
<b>ANNEX B (INFORMATIVE) LANGUAGE SPECIFIC VULNERABILITY TEMPLATE .....</b>	<b>164</b>
BIBLIOGRAPHY .....	167
<b>INDEX .....</b>	<b>170</b>

<b>Page 175: [2] Deleted</b>	<b>Stephen Michell</b>	<b>2017-03-10 11:50 AM</b>
[1] ISO/IEC Directives, Part 2, <i>Rules for the structure and drafting of International Standards</i> , 2004		
[2] ISO/IEC TR 10000-1, <i>Information technology — Framework and taxonomy of International Standardized Profiles — Part 1: General principles and documentation framework</i>		

<b>Page 175: [2] Deleted</b>	<b>Stephen Michell</b>	<b>2017-03-10 11:50 AM</b>
------------------------------	------------------------	----------------------------

- [1] ISO/IEC Directives, Part 2, *Rules for the structure and drafting of International Standards*, 2004
- [2] ISO/IEC TR 10000-1, *Information technology — Framework and taxonomy of International Standardized Profiles — Part 1: General principles and documentation framework*

<b>Page 175: [3] Formatted</b>	<b>Stephen Michell</b>	<b>2017-03-10 11:54 AM</b>
--------------------------------	------------------------	----------------------------

calibri

<b>Page 175: [4] Formatted</b>	<b>Stephen Michell</b>	<b>2017-03-10 11:55 AM</b>
--------------------------------	------------------------	----------------------------

Font:(Default) +Theme Body, 11 pt, Italic, Font color: Auto

<b>Page 175: [5] Formatted</b>	<b>Stephen Michell</b>	<b>2017-03-10 11:55 AM</b>
--------------------------------	------------------------	----------------------------

Font:Italic

<b>Page 175: [6] Formatted</b>	<b>Stephen Michell</b>	<b>2017-03-10 11:59 AM</b>
--------------------------------	------------------------	----------------------------

Not Strikethrough

<b>Page 175: [6] Formatted</b>	<b>Stephen Michell</b>	<b>2017-03-10 11:59 AM</b>
--------------------------------	------------------------	----------------------------

Not Strikethrough

<b>Page 175: [6] Formatted</b>	<b>Stephen Michell</b>	<b>2017-03-10 11:59 AM</b>
--------------------------------	------------------------	----------------------------

Not Strikethrough

<b>Page 175: [6] Formatted</b>	<b>Stephen Michell</b>	<b>2017-03-10 11:59 AM</b>
--------------------------------	------------------------	----------------------------

Not Strikethrough

<b>Page 175: [7] Deleted</b>	<b>Stephen Michell</b>	<b>2017-03-10 12:00 PM</b>
------------------------------	------------------------	----------------------------

(document RTCA SC167/DO-178B)

<b>Page 175: [7] Deleted</b>	<b>Stephen Michell</b>	<b>2017-03-10 12:00 PM</b>
------------------------------	------------------------	----------------------------

(document RTCA SC167/DO-178B)

<b>Page 175: [8] Formatted</b>	<b>Stephen Michell</b>	<b>2017-03-10 11:57 AM</b>
--------------------------------	------------------------	----------------------------

Not Strikethrough

<b>Page 175: [9] Deleted</b>	<b>Stephen Michell</b>	<b>2017-03-10 11:57 AM</b>
------------------------------	------------------------	----------------------------

:

<b>Page 175: [9] Deleted</b>	<b>Stephen Michell</b>	<b>2017-03-10 11:57 AM</b>
------------------------------	------------------------	----------------------------

:

<b>Page 175: [10] Formatted</b>	<b>Stephen Michell</b>	<b>2017-03-10 11:57 AM</b>
---------------------------------	------------------------	----------------------------

Not Strikethrough

<b>Page 175: [10] Formatted</b>	<b>Stephen Michell</b>	<b>2017-03-10 11:57 AM</b>
---------------------------------	------------------------	----------------------------

Not Strikethrough

Section Break (C<sub>BVQ+Unspecified Functionality</sub>, 111)

Ada, 13, 59, 63, 73, 76  
AMV – Type-breaking Reinterpretation of Data, 72  
*API*  
    Application Programming Interface, 16  
APL, 48  
Apple  
    OS X, 120  
*application vulnerabilities*, 9  
Application Vulnerabilities  
    Adherence to Least Privilege [XYN], 113  
    Authentication Logic Error [XZO], 135  
    Cross-site Scripting [XYT], 125  
    Discrepancy Information Leak [XZL], 129  
    Distinguished Values in Data Types [KLK], 112  
    Download of Code Without Integrity Check [DLB], 137  
    Executing or Loading Untrusted Code [XYS], 116  
    Hard-coded Password [XYP], 136  
    Improper Restriction of Excessive Authentication Attempts [WPL], 140  
    Improperly Verified Signature [XZR], 128  
    Inclusion of Functionality from Untrusted Control Sphere [DHU], 139  
    Incorrect Authorization [BJE], 138  
    Injection [RST], 122  
    Insufficiently Protected Credentials [XYM], 133  
    Memory Locking [ZXZ], 117  
    Missing or Inconsistent Access Control [XZN], 134  
    Missing Required Cryptographic Step [XZS], 133  
    Path Traversal [EWR], 130  
    Privilege Sandbox Issues [XYO], 114  
    Resource Exhaustion [XZP], 118  
    Resource Names [HTS], 120  
    Sensitive Information Uncleared Before Use [XZK], 130  
    Unquoted Search Path or Element [XZQ], 127  
    Unrestricted File Upload [CBF], 119  
    Unspecified Functionality [BVQ], 111  
    URL Redirection to Untrusted Site ('Open Redirect') [PYQ], 140  
    Use of a One-Way Hash without a Salt [MVX], 141  
*application vulnerability*, 5  
Ariane 5, 21  
  
bitwise operators, 48  
BJE – Incorrect Authorization, 138  
BJL – Namespace Issues, 43  
*black-list*, 120, 124  
BQF – Unspecified Behaviour, 92, 94, 95  
*break*, 60  
BRS – Obscure Language Features, 91  
buffer boundary violation, 23  
buffer overflow, 23, 26  
buffer underwrite, 23  
  
C, 22, 48, 50, 51, 58, 60, 63, 73  
C++, 48, 51, 58, 63, 73, 76, 86  
C11, 192  
*call by copy*, 61  
*call by name*, 61  
*call by reference*, 61  
*call by result*, 61  
*call by value*, 61  
*call by value-result*, 61  
CBF – Unrestricted File Upload, 119  
CCB – Enumerator Issues, 18  
CGA – Concurrency – Activation, 98  
CGM – Protocol Lock Errors, 105  
CGS – Concurrency – Premature Termination, 103  
CGT – Concurrency – Directed termination, 100  
CGX – Concurrent Data Access, 101  
CGY – Inadequately Secure Communication of Shared Resources, 107  
CJM – String Termination, 22  
CLL – Switch Statements and Static Analysis, 54  
concurrency, 2  
continue, 60  
cryptologic, 71, 128  
CSJ – Passing Parameters and Return Values, 61, 82  
  
dangling reference, 31  
DCM – Dangling References to Stack Frames, 63  
Deactivated code, 53  
Dead code, 53  
*deadlock*, 106  
DHU – Inclusion of Functionality from Untrusted Control Sphere, 139  
Diffie-Hellman-style, 136  
digital signature, 84  
DJS – Inter-language Calling, 81  
DLB – Download of Code Without Integrity Check, 137  
*Dos*  
    Denial of Service, 118  
dynamically linked, 83  
  
EFS – Use of unchecked data from an uncontrolled or tainted source, 109  
encryption, 128, 133  
endianness  
    big, 15  
    little, 15  
endianness, 14  
Enumerations, 18  
EOJ – Demarcation of Control Flow, 56  
EWD – Structured Programming, 60  
*EWF – Undefined Behaviour*, 92, 94, 95  
*EWR – Path Traversal*, 124, 130

exception handler, 86

*FAB – Implementation-defined Behaviour*, 92, 94, 95

FIF – Arithmetic Wrap-around Error, 34, 35

FLC – Numeric Conversion Errors, 20

Fortran, 73

GDL – Recursion, 67

generics, 76

GIF, 120

goto, 60

HCB – Buffer Boundary Violation (Buffer Overflow), 23, 82

HFC – Pointer Casting and Pointer Type Changes, 28

HJW – Unanticipated Exceptions from Library Routines, 86

*HTML* Hyper Text Markup Language, 124

HTS – Resource Names, 120

*HTTP* Hypertext Transfer Protocol, 127

IEC 60559, 16

IEEE 754, 16

IHN –Type System, 12

inheritance, 78

IP address, 119

Java, 18, 50, 52, 76

JavaScript, 125, 126, 127

JCW – Operator Precedence/Order of Evaluation, 47

KLK – Distinguished Values in Data Types, 112

KOA – Likely Incorrect Expression, 50

*language vulnerabilities*, 9

*Language Vulnerabilities*

- Argument Passing to Library Functions [TRJ], 80
- Arithmetic Wrap-around Error [FIF], 34
- Bit Representations [STR], 14
- Buffer Boundary Violation (Buffer Overflow) [HCB], 23
- Choice of Clear Names [NAI], 37
- Concurrency – Activation [CGA], 98
- Concurrency – Directed termination [CGT], 100
- Concurrency – Premature Termination [CGS], 103
- Concurrent Data Access [CGX], 101
- Dangling Reference to Heap [XYK], 31
- Dangling References to Stack Frames [DCM], 63
- Dead and Deactivated Code [XYQ], 52
- Dead Store [WXQ], 39
- Demarcation of Control Flow [EOJ], 56
- Deprecated Language Features [MEM], 97
- Dynamically-linked Code and Self-modifying Code [NYY], 83

Enumerator Issues [CCB], 18

Extra Intrinsics [LRM], 79

*Floating-point Arithmetic [PLF]*, xvii, 16

Identifier Name Reuse [YOW], 41

Ignored Error Status and Unhandled Exceptions [OYB], 68

Implementation-defined Behaviour [FAB], 95

Inadequately Secure Communication of Shared Resources [CGY], 107

Inheritance [RIP], 78

Initialization of Variables [LAV], 45

Inter-language Calling [DJS], 81

Library Signature [NSQ], 84

Likely Incorrect Expression [KOA], 50

Loop Control Variables [TEX], 57

Memory Leak [XYL], 74

Namespace Issues [BJL], 43

Null Pointer Dereference [XYH], 30

Numeric Conversion Errors [FLC], 20

Obscure Language Features [BRS], 91

Off-by-one Error [XZH], 58

Operator Precedence/Order of Evaluation [JCW], 47

Passing Parameters and Return Values [CSJ], 61, 82

Pointer Arithmetic [RVG], 29

Pointer Casting and Pointer Type Changes [HFC], 28

Pre-processor Directives [NMP], 87

Protocol Lock Errors [CGM], 105

Provision of Inherently Unsafe Operations [SKL], 90

Recursion [GDL], 67

Side-effects and Order of Evaluation [SAM], 49

Sign Extension Error [XZI], 36

String Termination [CJM], 22

Structured Programming [EWD], 60

Subprogram Signature Mismatch [OTR], 65

Suppression of Language-defined Run-time Checking [MXB], 89

Switch Statements and Static Analysis [CLL], 54

Templates and Generics [SYM], 76

Termination Strategy [REU], 70

Type System [IHN], 12

Type-breaking Reinterpretation of Data [AMV], 72

Unanticipated Exceptions from Library Routines [HJW], 86

Unchecked Array Copying [XYW], 27

Unchecked Array Indexing [XYZ], 25

Uncontrolled Fromat String [SHL], 110

Undefined Behaviour [EWF], 94

Unspecified Behaviour [BFQ], 92

Unused Variable [YZS], 40

Use of unchecked data from an uncontrolled or tainted source [EFS], 109

Using Shift Operations for Multiplication and Division [PIK], 35

language vulnerability, 5

LAV – Initialization of Variables, 45  
LHS (left-hand side), 241  
Linux, 120  
*livelock*, 106  
longjmp, 60  
LRM – Extra Intrinsics, 79

MAC address, 119  
macof, 118  
MEM – Deprecated Language Features, 97  
memory disclosure, 130  
Microsoft  
    Win16, 121  
    Windows, 117  
    Windows XP, 120  
*MIME*  
    Multipurpose Internet Mail Extensions, 124  
MISRA C, 29  
MISRA C++, 87  
*mlock()*, 117  
MVX – Use of a One-Way Hash without a Salt, 141  
MXB – Suppression of Language-defined Run-time Checking, 89

NAI – Choice of Clear Names, 37  
*name type equivalence*, 12  
NMP – Pre-Processor Directives, 87  
NSQ – Library Signature, 84  
*NTFS*  
    New Technology File System, 120  
NULL, 31, 58  
NULL pointer, 31  
null-pointer, 30  
NYY – Dynamically-linked Code and Self-modifying Code, 83

OTR – Subprogram Signature Mismatch, 65, 82  
OYB – Ignored Error Status and Unhandled Exceptions, 68, 163

Pascal, 82  
PHP, 124  
*PIK – Using Shift Operations for Multiplication and Division*, 34, 35, 197  
*PLF – Floating-point Arithmetic*, xvii, 16

POSIX, 99  
pragmas, 75, 96  
predictable execution, 4, 8  
PYQ – URL Redirection to Untrusted Site ('Open Redirect'), 140

real numbers, 16  
Real-Time Java, 105  
resource exhaustion, 118  
REU – Termination Strategy, 70  
*RIP – Inheritance*, xvii, 78

*rsize\_t*, 22  
RST – Injection, 109, 122  
*runtime-constraint handler*, 191  
RVG – Pointer Arithmetic, 29

safety hazard, 4  
safety-critical software, 5  
SAM – Side-effects and Order of Evaluation, 49  
security vulnerability, 5  
SelImpersonatePrivilege, 115  
setjmp, 60  
SHL – Uncontrolled Format String, 110  
*size\_t*, 22  
SKL – Provision of Inherently Unsafe Operations, 90  
software quality, 4  
*software vulnerabilities*, 9  
*SQL*  
    Structured Query Language, 112  
STR – Bit Representations, 14  
strcpy, 23  
strncpy, 23  
*structure type equivalence*, 12  
switch, 54  
SYM – Templates and Generics, 76  
symlink, 131

*tail-recursion*, 68  
templates, 76, 77  
TEX – Loop Control Variables, 57  
**thread**, 2  
TRJ – Argument Passing to Library Functions, 80  
*type casts*, 20  
*type coercion*, 20  
*type safe*, 12  
*type secure*, 12  
*type system*, 12

UNC  
    Uniform Naming Convention, 131  
    Universal Naming Convention, 131  
Unchecked\_Conversion, 73  
UNIX, 83, 114, 120, 131  
unspecified functionality, 111  
*Unspecified functionality*, 111  
*URI*  
    Uniform Resource Identifier, 127  
URL  
    Uniform Resource Locator, 127

*VirtualLock()*, 117

*white-list*, 120, 124, 127  
Windows, 99  
WPL – Improper Restriction of Excessive Authentication Attempts, 140  
WXQ – Dead Store, 39, 40, 41

## XSS

- Cross-site scripting, 125
- XYH – Null Pointer Deference, 30
- XYK – Dangling Reference to Heap, 31
- XYL – Memory Leak, 74
- [XYM – Insufficiently Protected Credentials](#)*, 9, 133
- XYN – Adherence to Least Privilege, 113
- XYO – Privilege Sandbox Issues, 114
- XYP – Hard-coded Password, 136
- XYQ – Dead and Deactivated Code, 52
- XXS – Executing or Loading Untrusted Code, 116
- XYT – Cross-site Scripting, 125
- XYW – Unchecked Array Copying, 27
- XYZ – Unchecked Array Indexing, 25, 28
- XZH – Off-by-one Error, 58
- XZI – Sign Extension Error, 36
- XZK – Sensitive Information Uncleared Before Use,  
130
- XZL – Discrepancy Information Leak, 129
- XZN – Missing or Inconsistent Access Control, 134
- XZO – Authentication Logic Error, 135
- XZP – Resource Exhaustion, 118
- XZQ – Unquoted Search Path or Element, 127
- XZR – Improperly Verified Signature, 128
- XZS – Missing Required Cryptographic Step, 133
- XZX – Memory Locking, 117

YOW – Identifier Name Reuse, 41, 44

*[YZS – Unused Variable](#)*, 39, 40

—————Section Break (Next Page)—————

