



# JEAS – JAROONA ENTERPRISE APPLICATION SECURITY

**Machine Learning based  
Vulnerabilities Detection to protect  
Enterprise Software, Blockchains and IoT**



# STATE OF PLAY, ISSUES

- ➔ Enterprise software is not secure – security exploits in source code
- ➔ Blockchain systems are not secure – security exploits in blockchain software, smart contracts, no protection of network perimeter
- ➔ IoT – not secure-by-design – exposed to attackers



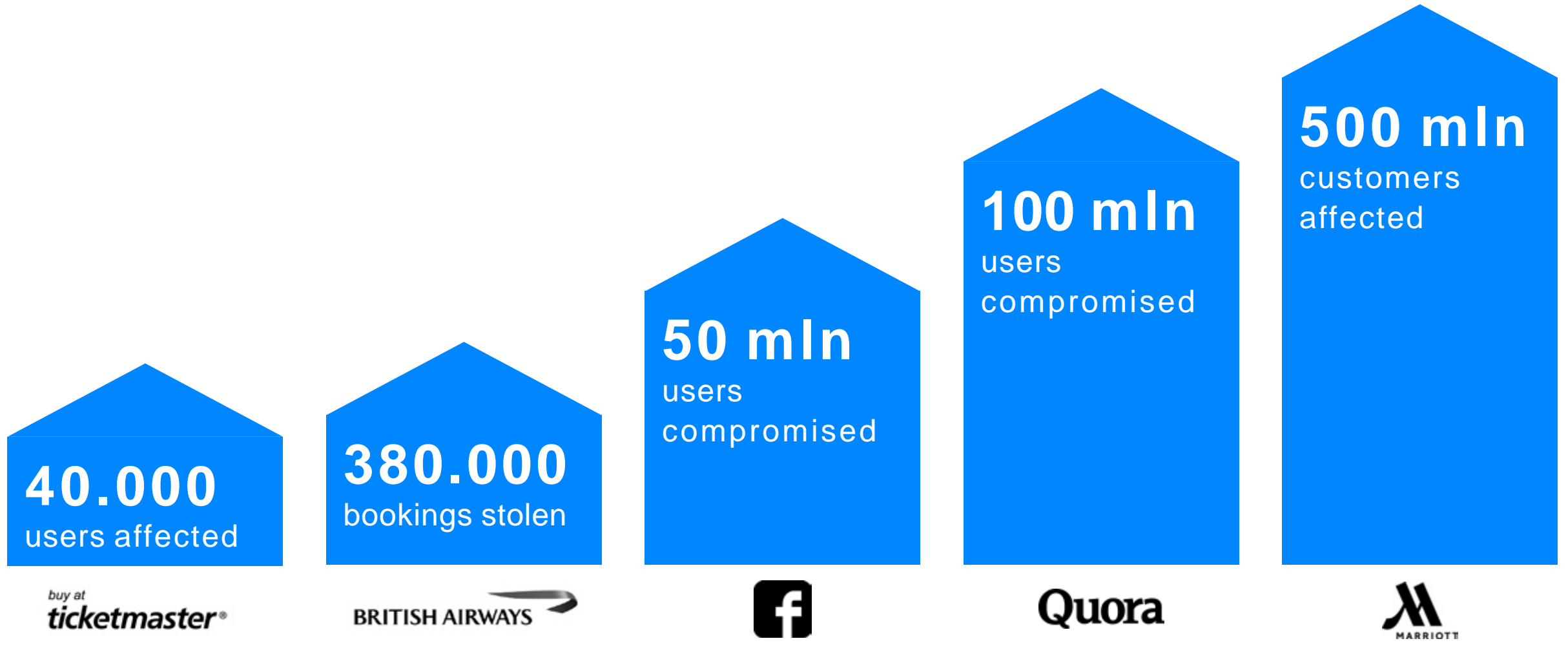
Growing number of successful cyberattacks worldwide!

In 2018 alone, a billion users were compromised in centralized solutions

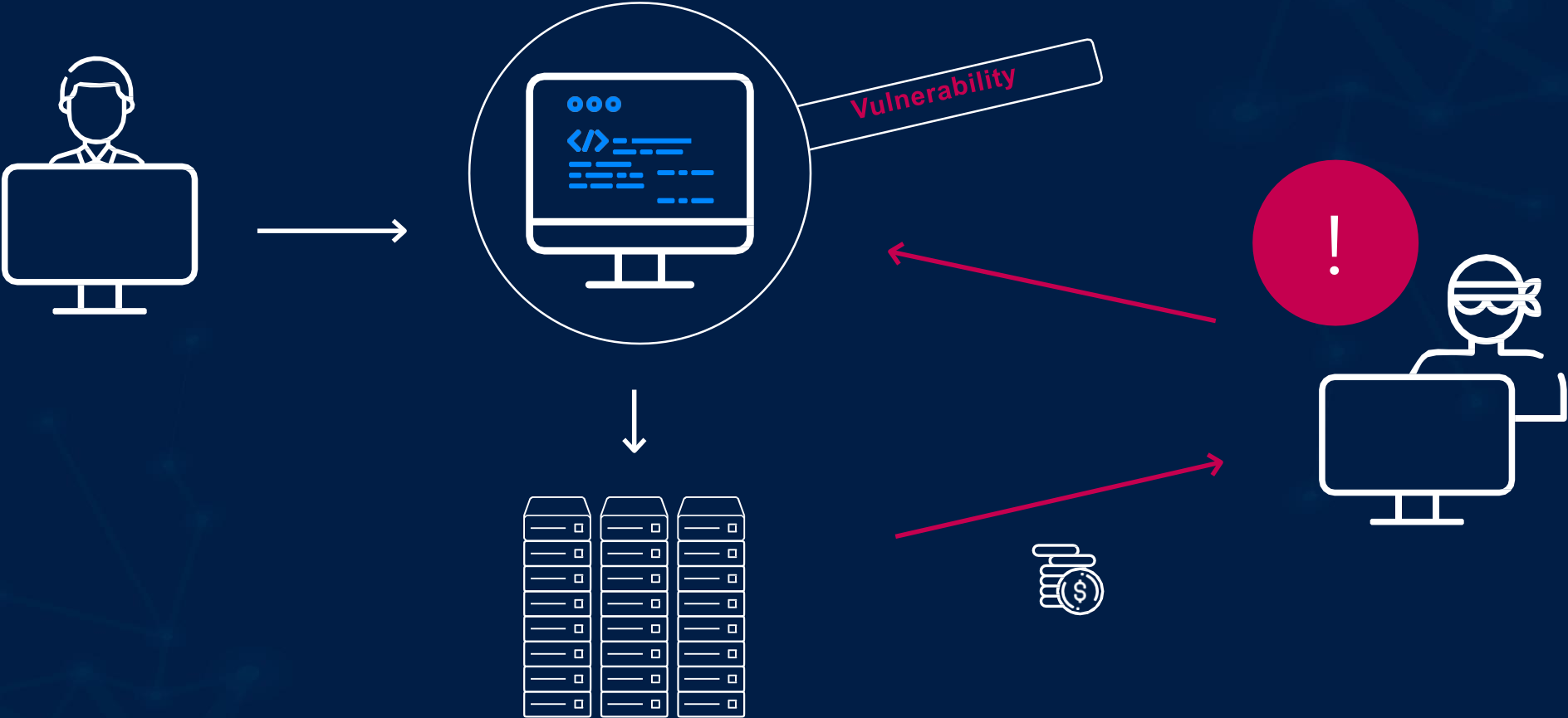
\$1.1 billion was stolen from blockchains



# LARGEST CYBERATTACKS IN 2018



# THE APPLICATION SECURITY TRAP



# Code Vulnerabilities and Exploits (CVE) Listings

 <https://www.cvedetails.com/index.php>

 <https://www.us-cert.gov/ncas/bulletins>

 <https://nvd.nist.gov/>



!

Hundreds of new issues reported daily

CVEs are categorized and classified

Fixes are suggested in GitHub and other developer platforms



# NON-AI SOLUTIONS FOR CODE AUDIT HAVE SEVERE LIMITATIONS

- Hand-engineered, predefined rule based, cost inefficient, human error prone and labor intensive
- Not efficient against zero-days attacks
- Use legacy scientific concepts – rules based static / dynamic code analysis
- Reactive – only after attack, the security rule is deployed



**JAROONA  
SOLVES  
THESE  
LIMITATIONS**



# CORE TEAM



→ 100+ years of experience in Cybersecurity, AI and Deep Learning

→ Founded two profitable companies in the past decade



**Christian  
Bacher**

CEO/Co-Founder  
Former IBM,  
Raiffeisen



**Anna  
Bacher**

CTO/Co-Founder  
Former Accenture,  
IBM, Temenos



**Dr. Erich  
Gstrein**

Chief Science  
Officer (CSO)  
Multiple Awards



**Heimo  
Tomann**

CFO  
Former Shell, MOL,  
Smart Engine



**Adrian  
Procopenco**

Lead  
JAVA Developer



**Ivan  
Chilienco**

Lead Full stack  
Developer





# ADVISORS



 Top experts in cybersecurity, blockchain and industry software



**Stephan  
Tual**

Former CCO  
Ethereum Founder  
of Atlas Neue



**Jordan  
Woods**

Top Expert in en-  
terprise blockchain  
technology



**Sion  
Retzkin**

Top Cyber-  
security Expert  
CISO & Director



**Paolo  
Barbesino**

Top Financial Ser-  
vices Expert



**Ivo  
Grlica**

Top Ico Legal  
Advisor





# JEAS' VALUE PROPOSITION



Machine and Deep Learning based vulnerabilities detection and remediation platform



Real-time code fix suggestions



The platform learns new vulnerabilities and code fixes from thousands of new publications daily in more than 3.000 security databases worldwide



Protection throughout development lifecycle



Web 3.0 compliant with API and microservices protection



**Ten times higher** detection accuracy and performance than Industry standard Web 2.0 rule-based solutions



# MACHINE LEARNING AI

Programs for learning

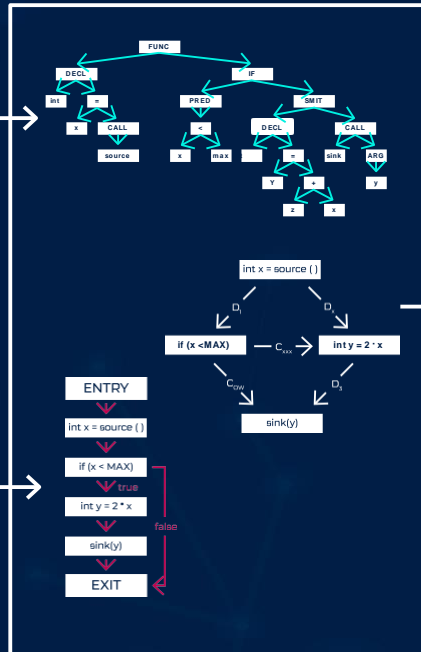
Parsing and Multi-layered code presentation

Extracting Vulnerability Syntax, Semantics, Code intent

Vector representation

Labeling

ML and Deep Learning



Programs for detection



```
static int eth_can_rx(NetClientState *nc)
{
    struct xlx_ethlite *s = qemu_get_nic_opaque(nc);
    unsigned int rxbase = s->rxbuf * (0x800 / 4);
    return !!(s->regs[rxbase + R_RX_CTRL0] & CTRL_S);
}

static ssize_t eth_rx(NetClientState *nc, const uint8_t *buf, size_t size)
{
    struct xlx_ethlite *s = qemu_get_nic_opaque(nc);
    unsigned int rxbase = s->rxbuf * (0x800 / 4);

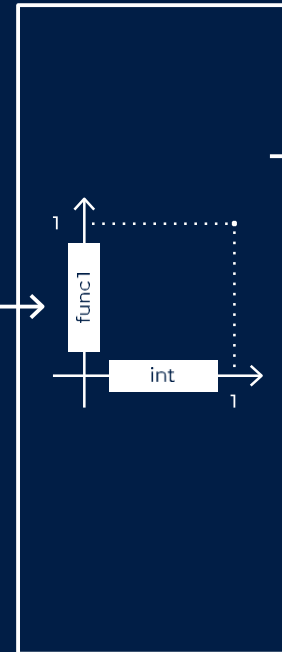
    /* DL Filter. */
    if (C(buf[0] & 0x80) && memchr(&s->conf.bacaddr, 0, buf, 0))
        return size;

    if (s->regs[rxbase + R_RX_CTRL0] & CTRL_S) {
        D(qemu_log("ethlite lost packet %x\n", s->regs[R_RX_CTRL0]);
        return -1;
    }

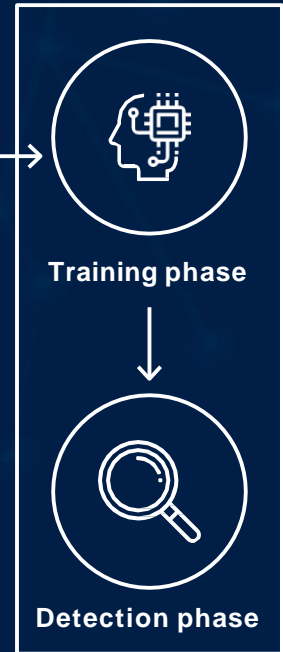
    D(qemu_log("Xs %zd rxbase=%x\n", ...func...) size, rxbase));
    memcpy(&s->regs[rxbase + R_RX_BUF0], buf, size);

    s->regs[rxbase + R_RX_CTRL0] |= CTRL_S;
    if (s->regs[R_RX_CTRL0] & CTRL_I) {
        eth_pulse_irq(s);
    }

    /* If C_rx_pingpong was set flip buffers. */
    s->rxbuf ^= s->C_rx_pingpong;
    return size;
}
```



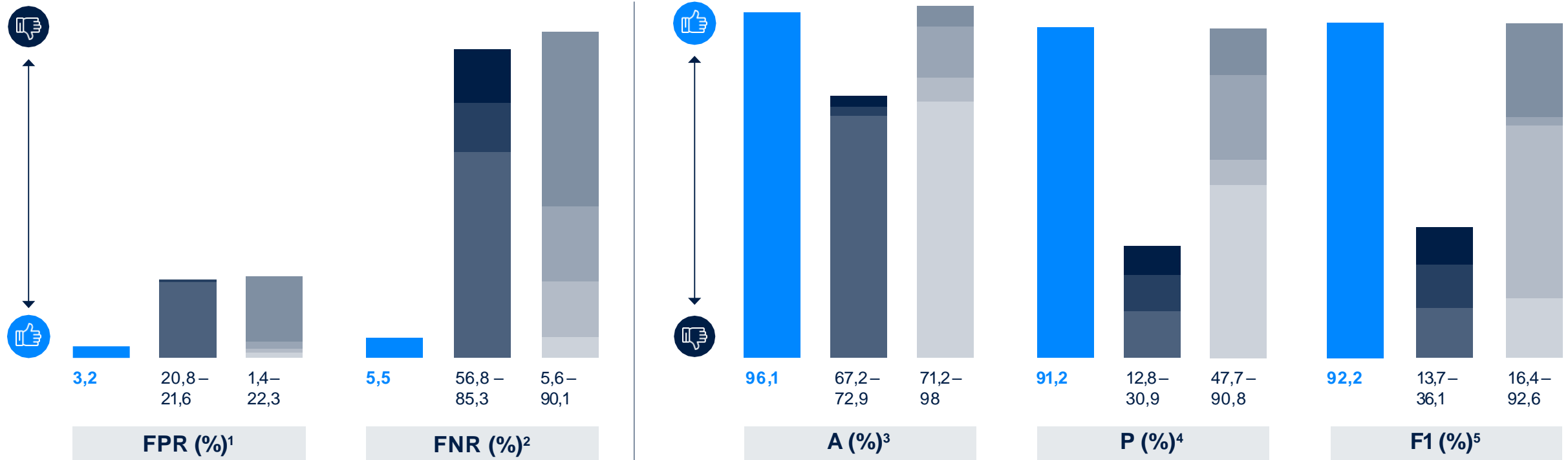
- Good
- Vulnerable
- CWE-119
- CWE-264
- CWE-399
- ...
- CWE-284



- Good
- Vulnerable
- CWE-119
- CWE-264



# COMPETITIVE COMPARISON



■ JAROONA    
 ■ RULE-BASED INDUSTRY STANDARD    
 ■ AI RESEARCH PROJECTS

- 1 **FPR – False-positive rate.** The proportion of false – positive samples in the total samples that are not vulnerable. Waste of time for manual review for developers and security officers. The lower the number, the better.
- 2 **FNR – False-negative rate.** The proportion of false – negative samples in the total samples that are vulnerable. Its dangerous as potentially severe vulnerabilities are not found. The lower the number, the better.
- 3 **A – Accuracy.** The correctness of all detected samples. The higher the %, the more accurate is the model.
- 4 **P – Precision.** The correctness of detected vulnerable samples. The higher the %, the more precise is the model.
- 5 **F1 – measure.** The overall effectiveness considering both precision and false-negative rate. The higher the %, the more effective is the model.



# OUR COMPETITIVE ADVANTAGE



# BOOK YOUR DEMO TODAY!



We found vulnerabilities with highest severity score (10) which top commercial products could not find!

The screenshot displays the JARONA web application security scanner interface. At the top, there is a navigation bar with 'HOME', 'APPLICATION UPLOAD', 'ABOUT', and 'CONTACT'. Below this, there are fields for 'APPLICATION' (xllrx\_pchilbac), 'LANGUAGE' (C/C++), and 'DETECTION RESPONSE' (3523 rrs). There are 'EXIT' and 'RESET' buttons. A table lists detected vulnerabilities:

VULNERABILITY	SEVERITY	NUMBER
zwellm_cgd	10	1
pointer_usage		
owb390_cgd		
api_calls		

To the right of the table, a code snippet is shown for the 'zwellm\_cgd' vulnerability:

```
static int win_son_ridGetClientState (int)
{
  int i;
  int j;
  int k;
  int l;
  int m;
  int n;
  int o;
  int p;
  int q;
  int r;
  int s;
  int t;
  int u;
  int v;
  int w;
  int x;
  int y;
  int z;
  int aa;
  int ab;
  int ac;
  int ad;
  int ae;
  int af;
  int ag;
  int ah;
  int ai;
  int aj;
  int ak;
  int al;
  int am;
  int an;
  int ao;
  int ap;
  int aq;
  int ar;
  int as;
  int at;
  int au;
  int av;
  int aw;
  int ax;
  int ay;
  int az;
  int ba;
  int bb;
  int bc;
  int bd;
  int be;
  int bf;
  int bg;
  int bh;
  int bi;
  int bj;
  int bk;
  int bl;
  int bm;
  int bn;
  int bo;
  int bp;
  int bq;
  int br;
  int bs;
  int bt;
  int bu;
  int bv;
  int bw;
  int bx;
  int by;
  int bz;
  int ca;
  int cb;
  int cc;
  int cd;
  int ce;
  int cf;
  int cg;
  int ch;
  int ci;
  int cj;
  int ck;
  int cl;
  int cm;
  int cn;
  int co;
  int cp;
  int cq;
  int cr;
  int cs;
  int ct;
  int cu;
  int cv;
  int cw;
  int cx;
  int cy;
  int cz;
  int da;
  int db;
  int dc;
  int dd;
  int de;
  int df;
  int dg;
  int dh;
  int di;
  int dj;
  int dk;
  int dl;
  int dm;
  int dn;
  int do;
  int dp;
  int dq;
  int dr;
  int ds;
  int dt;
  int du;
  int dv;
  int dw;
  int dx;
  int dy;
  int dz;
  int ea;
  int eb;
  int ec;
  int ed;
  int ee;
  int ef;
  int eg;
  int eh;
  int ei;
  int ej;
  int ek;
  int el;
  int em;
  int en;
  int eo;
  int ep;
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  int er;
  int es;
  int et;
  int eu;
  int ev;
  int ew;
  int ex;
  int ey;
  int ez;
  int fa;
  int fb;
  int fc;
  int fd;
  int fe;
  int ff;
  int fg;
  int fh;
  int fi;
  int fj;
  int fk;
  int fl;
  int fm;
  int fn;
  int fo;
  int fp;
  int fq;
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  int fs;
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  int fv;
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  int fy;
  int fz;
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  int hv;
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  int hz;
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  int ic;
  int id;
  int ie;
  int if;
  int ig;
  int ih;
  int ii;
  int ij;
  int ik;
  int il;
  int im;
  int in;
  int io;
  int ip;
  int iq;
  int ir;
  int is;
  int it;
  int iu;
  int iv;
  int iw;
  int ix;
  int iy;
  int iz;
  int ja;
  int jb;
  int jc;
  int jd;
  int je;
  int jf;
  int jg;
  int jh;
  int ji;
  int jj;
  int jk;
  int jl;
  int jm;
  int jn;
  int jo;
  int jp;
  int jq;
  int jr;
  int js;
  int jt;
  int ju;
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  int jw;
  int jx;
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  int ll;
  int lm;
  int ln;
  int lo;
  int lp;
  int lq;
  int lr;
  int ls;
  int lt;
  int lu;
  int lv;
  int lw;
  int lx;
  int ly;
  int lz;
  int ma;
  int mb;
  int mc;
  int md;
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  int ul;
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  int un;
  int uo;
  int up;
  int uq;
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  int wz;
  int xa;
  int xb;
  int xc;
  int xd;
  int xe;
  int xf;
  int xg;
  int xh;
  int xi;
  int xj;
  int xk;
  int xl;
  int xm;
  int xn;
  int xo;
  int xp;
  int xq;
  int xr;
  int xs;
  int xt;
  int xu;
  int xv;
  int xw;
  int xx;
  int xy;
  int xz;
  int ya;
  int yb;
  int yc;
  int yd;
  int ye;
  int yf;
  int yg;
  int yh;
  int yi;
  int yj;
  int yk;
  int yl;
  int ym;
  int yn;
  int yo;
  int yp;
  int yq;
  int yr;
  int ys;
  int yt;
  int yu;
  int yv;
  int yw;
  int yx;
  int yy;
  int yz;
  int za;
  int zb;
  int zc;
  int zd;
  int ze;
  int zf;
  int zg;
  int zh;
  int zi;
  int zj;
  int zk;
  int zl;
  int zm;
  int zn;
  int zo;
  int zp;
  int zq;
  int zr;
  int zs;
  int zt;
  int zu;
  int zv;
  int zw;
  int zx;
  int zy;
  int zz;
}
```



# CONTACT US



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