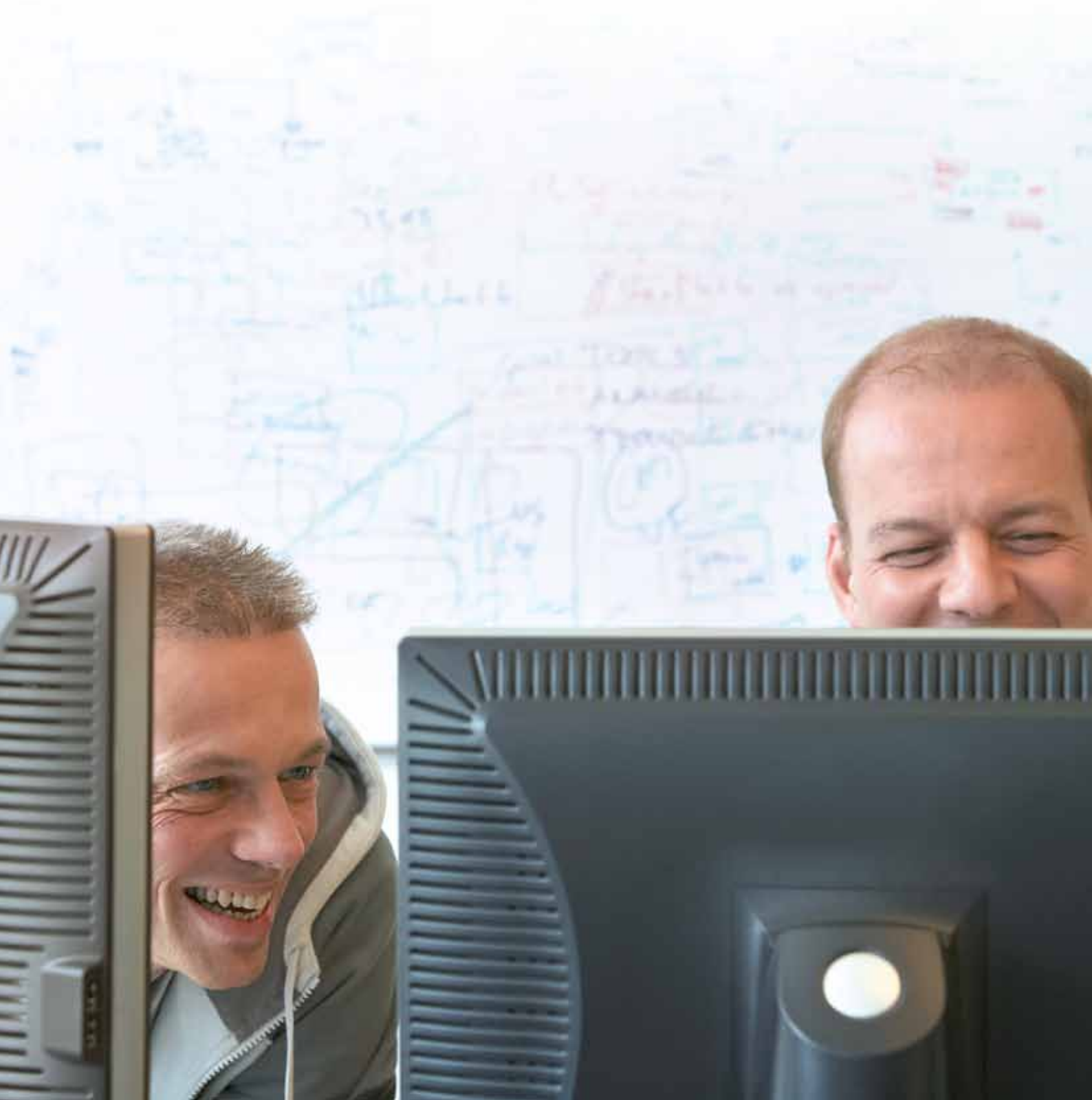


ADINOVUM

ENGINEERING THE IMPOSSIBLE.



```

5.     public E edge;
6.     public DijkstraInfo()
7.     {
8.         this.distance = Integer.MAX_VALUE;
9.         this.predecessor = null;
10.        this.edge = null;
11.    }
12.    public String toString()
13.    {
14.        return "["+this.distance+","+this.predecessor+","+this.edge+"]";
15.    }
16. }
17. private static class DijkstraComp<V extends Vertex, E extends WeightedEdge<V>>
18.     implements Comparator<V>
19.     {
20.         private HashMap<V, DijkstraInfo<E>> info;
21.         public DijkstraComp(HashMap<V,DijkstraInfo<E>> Info)
22.         {
23.             this.info = Info;
24.         }
25.         public int compare(V a, V b)
26.         {
27.             int ad = this.info.get(a).distance;
28.             int bd = this.info.get(b).distance;
29.             if(ad == bd) return 0;
30.             if(ad < bd) return -1;
31.             return 1;
32.         }
33.     }
34.     public static<V extends Vertex, E extends WeightedEdge<V>>
35.     HashMap<V,Vector<E>> compute(Graph<V,E> G, V s)
36.     {
37.         Vector<V> vertices = G.getVertices();
38.         Vector<E> edges = G.getEdges();
39.         HashMap<V, Vector<E>> adjList = G.getAdjacencyList();
40.         HashMap<V, DijkstraInfo<E>> info = new HashMap<V,DijkstraInfo<E>>();
41.         PriorityQueue<V> Q = new PriorityQueue<V>(edges.size(), new
42.         DijkstraComp<V,E>(info));
43.         for(Enumeration<V> e=vertices.elements(); e.hasMoreElements(); )
44.             info.put(e.nextElement(), new DijkstraInfo<E>());
45.         info.get(s).distance = 0;
46.         Q.addAll(vertices);
47.         while(!Q.isEmpty())
48.         {
49.             V v = Q.poll();
50.             for(Enumeration<E> e = adjList.get(v).elements(); e.hasMoreElements(); )
51.             {
52.                 E t = e.nextElement();
53.                 if(info.get(v).distance + t.getWeight() < info.get(t.getEndVertex()).distance)
54.                 {
55.                     info.get(t.getEndVertex()).distance = info.get(v).distance + t.getWeight();
56.                     info.get(t.getEndVertex()).predecessor = v;
57.                     info.get(t.getEndVertex()).edge = t;
58.                     //Q erneuern
59.                     Q.remove(t.getEndVertex());
60.                     Q.add(t.getEndVertex());

```



PERFORMANCE... END-TO-END AND BEYOND.

AdNovum specializes in customized application, security and integration solutions at the high end of the market. The renowned software engineering company offers comprehensive software engineering services from the initial requirements analysis and specification to the integration and productive deployment of software and hardware.

At AdNovum, specialized project teams achieve superior results in the high-quality Swiss engineering tradition. AdNovum stands for reliability, and its trademarks are technical competence and broad experience in the development of demanding and complex solutions. The AdNovum clientele consists of prestigious organizations with stringent data protection requirements from both the private and public sector.

AdNovum's service offering includes:

Development of business and web-based applications

- E-banking, banking business
- Secure ECM (Enterprise Content Management)
- CRM, contact center
- E-health and e-government
- Logistics, ERP
- Facility management

Security engineering

- Single sign-on portals (SSO)
- Revisable systems, end-to-end security
- Access and identity management
- Secure communication

Integration, migration, software renovation

- Integration of mainframes, servers, workstations, legacy systems, databases, telephony systems
- Integration of third-party systems (core banking systems, SAP-certified integration)
- Interface and middleware components, protocol and data conversion
- Data and technology migration
- Renovation of legacy systems

IT consulting

- Security and technology reviews
- IT architecture, security and strategy

Maintenance, support

- 7 x 24h support, 2nd-/3rd-level application support
- Maintenance of legacy applications



```
1. import std.math;
2. public class MergeSort
3. {
4.     public void sort(int[] Array)
5.     {
6.         this.mergeSort(Array,0,Array.length-1);
7.     }
8.     private void mergeSort(int[] A, int f, int l)
9.     {
10.        if(f < l)
11.        {
12.            int m = cast(int)floor((l+f)/2);
13.            this.mergeSort(A, f, m);
14.            this.mergeSort(A, m+1, l);
15.            this.merge(A, f, m, l);
16.        }
17.    }
18.    private void merge(int[] A, int f, int m, int l)
19.    {
20.        int tmp[] = new int[(l-f)+1];
21.        int ai = f;
22.        int bi = m+1;
23.        for(int i=0; i < tmp.length;i++)
24.        {
25.            if(ai <= m && (bi > l || (A[ai]< A[bi])) )
26.            {
27.                tmp[i] = A[ai];
28.                ai++;
29.            }
30.            else
31.            {
32.                tmp[i] = A[bi];
33.                bi++;
34.            }
35.        }
36.        for(int i=0; i < tmp.length; i++)
37.            A[f+i] = tmp[i];
38.    }
39. }
40. }
41. }
42. import std.stdio;
43. public void main()
44. {
45.     int[] A = [4,30,1,2,3,35,37,88,99];
46.     MergeSort algo = new MergeSort();
47.     algo.sort(A);
48.     foreach(int e; A)
49.         writef(e, " ");
50. }
```



Solutions

PRACTICAL, BUT FAR FROM AVERAGE.

AdNovum delivers robust IT solutions to demanding customers.

AdNovum's solution-oriented approach is characterized by:

- a clear focus on engineering and security
- practical and adaptive project management processes

AdNovum-built applications excel in:

- reliability, performance, and scalability
- proven integration and security components
- finely tuned awareness of market requirements, legal restrictions, and regulatory burdens
- use of open state-of-the-art technologies and standards

Projects

EXTENDED LIFE CYCLES AND SHORTCUTS TO MARKET.

AdNovum tackles large-scale projects as a general contractor or together with partners. In both cases the customer's needs come first. AdNovum's solid customer relations are testimony to the lasting value of the services rendered.

As a customer, you can rest assured that your project will succeed:

- You know your contact people and that you are working with top professionals.
- You have the guarantee that your resources are optimally deployed and your investment is well protected.
- You can bank on your new solution being delivered on time and to the specified quality.
- You reduce your IT costs and your time to market.
- You can count on us to cover all facets of the software life cycle – and on our flexibility to manage change.
- You increase your added value through innovative applications and maintain your edge on the competition.

IT consulting

ENGINEERS AS ADVISORS.

AdNovum actively shares its experience building demanding IT projects through consulting mandates and IT reviews. An AdNovum software engineer is assigned the case, bringing with him the relevant knowledge, experience and support from the entire knowledge pool of AdNovum.

Maintenance and support

FULL SERVICE FROM ONE SOURCE.

AdNovum offers comprehensive maintenance and support services. In consultation with the customer, lean service level agreements (SLAs) are devised that match the specific needs of our customers as closely as the software. AdNovum can also provide continuation for maintenance and support programs begun by customers or third parties.

```

2. import java.util.Enumeration;
3. import java.util.PriorityQueue;
4. import java.util.Vector;
5. public class Kruskal
6. {
7.     public static <V extends Vertex,E extends WeightedEdge<V>> Vector<E> compute (UndirectedGraph<V,E> G)
8.     {
9.         Vector<V> vertices = G.getVertices();
10.        Vector<E> edges = G.getEdges();
11.        UnionFind uf = new UnionFind();
12.        Vector<E> mST = new Vector<E>();
13.        for(Enumeration<V> e = vertices.elements(); e.hasMoreElements(); )
14.        {
15.            uf.createUnion(e.nextElement());
16.        }
17.        PriorityQueue<E> Q = new PriorityQueue<E>(edges.size(),new Comparator<E>(){
18.            public int compare(E a, E b)
19.            {
20.                int aw = a.getWeight();
21.                int bw = b.getWeight();
22.                if (aw==bw)return 0;
23.                if (aw<bw)return -1;
24.                return 1;
25.            }
26.        });
27.        Q.addAll(edges);
28.        while(Q.size() > 0)
29.        {
30.            E e = Q.poll();
31.            if(uf.find(e.getStartVertex()) != uf.find(e.getEndVertex()))
32.            {
33.                uf.merge(e.getStartVertex(),e.getEndVertex());
34.                mST.add(e);
35.            }
36.        }
37.        return mST;
38.    }
39. }
40. class KruskalProg
41. {
42.     public static void main(String[] Args)
43.     {
44.         Vector<Vertex> v = new Vector<Vertex>();
45.         v.add(new Vertex());
46.         v.add(new Vertex());
47.         v.add(new Vertex());
48.         Vector<WeightedEdge<Vertex>> e = new Vector<WeightedEdge<Vertex>>();
49.         e.add(new WeightedEdge<Vertex>(v.get(0),v.get(1),10));
50.         e.add(new WeightedEdge<Vertex>(v.get(1),v.get(2),15));
51.         e.add(new WeightedEdge<Vertex>(v.get(0),v.get(2),7));
52.         UndirectedGraph<Vertex, WeightedEdge<Vertex>> g = new UndirectedGraph<Vertex,
53. WeightedEdge<Vertex>>(v,e);
54.         System.out.println(g);
55.         System.out.println(Kruskal.compute(g));
56.     }
57. }
58. }

```



Software engineering

MILESTONES FOR TOMORROW.

An engineering company with tradition, AdNovum relies on a proven software engineering process that has matured through the completion of many successful projects:

- clearly defined project phases with milestones and standard deliverables
- professional technology management that results in efficient and controlled usage of innovative technology
- quality assurance process with predetermined check points (architecture and security sign-offs)
- automated review of central quality factors (source code quality, verification that the project can be compiled, deployed, and executed)
- controlled change management
- systematic controlling and reporting

Technical environment

OPEN INTERFACES FOR NEW CHALLENGES.

For the development of its best-of-breed software solutions, AdNovum employs a targeted combination of proven commercial products with open-source software and open standards. All technology components are updated at regular intervals and new developments followed closely to ensure a continuous renewal of the technology stack. The technology environment currently relies on the following key components:

- Primary platforms: Solaris and Linux
- Other platforms: Windows, virtualization platforms
- Java / Java EE (Oracle WebLogic, IBM WebSphere, JBoss)
- Oracle database
- Oracle UCM for Enterprise Content Management
- Eclipse as IDE
- Other tools development environment: SVN, CVS, Ant, Maven, soapui, Dependency Matrix Analyzer, Junit, Grinder, JProbe
- Important frameworks: JEE5, Nevis, Spring, Hibernate, JSF, Struts, Wicket

Knowledge and project management

GREY MATTER IN MOTION.

AdNovum's strengths in knowledge and project management lead to high-quality deliverables. A few "secrets" to our success are:

- the competence and experience of AdNovum employees
- consolidated resource and project planning applying purpose-built instruments
- standardized and mostly automated project set-ups
- clear allocation of roles, detailed role and competence descriptions, high level of role consistency

```
2. import java.util.HashMap;
3. import java.util.Hashtable;
4. import java.util.Vector;
5. public class BellmanFord
6. {
7.     public static<V extends Vertex, E extends WeightedEdge<V>> HashMap<V,Vector<E>> compute(Graph<V,E> G, V
8. )
9.     {
10.         Vector<V> vertices = G.getVertices();
11.         Vector<E> edges = G.getEdges();
12.         HashMap<V,Vector<E>> invAdjList = invertAdjacencyList(G.getAdjacencyList(), vertices);
13.         Hashtable<Integer, Hashtable<V,Integer>> matrix = new Hashtable<Integer,Hashtable<V,Integer>>(vertices.
14. size());
15.         for(int i=0; i < vertices.size();i++)
16.         {
17.             matrix.put(i, new Hashtable<V,Integer>(vertices.size()));
18.             for(Enumeration<V> e = vertices.elements(), e.hasMoreElements();)
19.             {
20.                 matrix.get(i).put(e.nextElement(),Integer.MAX_VALUE);
21.             }
22.             HashMap<V,E> predecessor = new HashMap<V, E>();
23.             for(Enumeration<V> e = vertices.elements(); e.hasMoreElements();)
24.                 predecessor.put(e.nextElement(), null);
25.             matrix.get(i).put(i, 0);
26.             for(int i=1; i < vertices.size();i++)
27.             {
28.                 for(Enumeration<V> ev=vertices.elements(); ev.hasMoreElements();)
29.                 {
30.                     V v = ev.nextElement();
31.                     E pre = null;
32.                     int min = matrix.get(i-1).get(v);
33.                     for(Enumeration<E> ea = invAdjList.get(v).elements(); ea.hasMoreElements();)
34.                     {
35.                         E t = ea.nextElement();
36.                         if( matrix.get(i-1).get(t.getStartVertex()) != Integer.MAX_VALUE && matrix.get(i-1).get(t.getStartVer-
37. tex()) + t.getWeight() < min )
38.                         {
39.                             min = matrix.get(i-1).get(t.getStartVertex()) + t.getWeight();
40.                             pre = t;
41.                         }
42.                     }
43.                     matrix.get(i).put(v,min);
44.                     if(pre != null)
45.                         predecessor.put(v,pre);
46.                 }
47.             }
48.             HashMap<V,Vector<E>> retVal = new HashMap<V,Vector<E>>();
49.             for(Enumeration<V>e= vertices.elements(), e.hasMoreElements();)
50.                 retVal.put(e.nextElement(), new Vector<E>());
51.             for(Enumeration<V>e = vertices.elements(),e.hasMoreElements();)
52.             {
53.                 Vertex v = e.nextElement();
54.                 Vertex pre = v;
55.                 while(predecessor.get(pre) != null)
```

References

ACHIEVEMENT AS A MOTOR OF INNOVATION.

AdNovum draws on vast experience creating successful solutions, even for the most complex problems.

Application development

- FDJP: Central Migration Information System (CEMIS); electronic dossiers
- UBS: Point-of-sale application
- Swiss Post International: ERP logistics application GLOBE
- Tax office of the Canton of Zurich: Registry and administration of dossiers
- UBS: Facility management (GEIS/GIKUS)
- SIX Group: PayNet, electronic processing of bills (EBPP, Electronic Bill Presentment and Payment)
- FOITT/OFCOM: SOA architecture / e-licensing
- UBS: Enterprise Content Management (Secure ECM)

Security and integration (SSO portals, IDM, PKI)

- UBS: Security stack / certificate management system
- FDJP: Single sign-on portal (SSO)
- Swiss Post: Single sign-on portal "My Post Business"
- Swiss Post International: Extranet single sign-on solution
- Die Mobiliar: Web entry service
- PostFinance: E-finance and pf.ch
- PostFinance: IDM/PKI and UAM (Unix Access Management)
- SwissSign: Post certificate

E-banking and secure messaging

- UBS: E-banking via Internet and phone
- Privatbank IHAG: E-banking, content management system
- Wegelin & Co. Private Bankers: E-banking
- UBS Mailbox

IT consulting

- Proof of concept for a secure Java EE architecture strategy and implementation roadmap for a Swiss federal office
- Technical management and coordination of a security program for a major Swiss financial service provider
- Evaluation of various authentication mechanisms for a Cantonal Bank
- Technical reviews (SOA, architecture, code, deployment, performance) for various financial service and insurance companies

```
2. import java.util.Vector;
3. import java.util.HashMap;
4. import java.util.Iterator;
5. public class BFS {
6. {
7.     enum State
8.     {
9.         WHITE,
10.        GRAY,
11.        BLACK
12.    }
13.    static class BFSInfo
14.    {
15.        private Vertex predecessor;
16.        private Vertex vertex;
17.        private int distance;
18.        private State state;
19.        public BFSInfo(Vertex v)
20.        {
21.            this.vertex = v;
22.            this.predecessor = null;
23.            this.distance = 0;
24.            this.state = State.WHITE;
25.        }
26.        public Vertex getPredecessor()
27.        {
28.            return this.predecessor;
29.        }
30.        public void setPredecessor(Vertex v)
31.        {
32.            this.predecessor = v;
33.        }
34.        public int getDistance()
35.        {
36.            return this.distance;
37.        }
38.        public void setDistance(int d)
39.        {
40.            this.distance = d;
41.        }
42.        public State getState()
43.        {
44.            return this.state;
45.        }
46.        public void setState(State s)
47.        {
48.            this.state = s;
49.        }
50.    }
51.    public static <V extends Vertex, E extends Edge> HashMap<V, Integer> compute(Graph<V, E> G, V start)
52.    {
53.        HashMap<V, Vector<E>> adjList = G.getAdjacencyList();
54.        Vector<V> vertices = G.getVertices();
55.        HashMap<V, BFSInfo> info = new HashMap<V, BFSInfo>(adjList.size() * 25);
56.        //Info Quellen
57.        for(Enumeration<V> e = vertices.elements(); e.hasMoreElements();)
```

AdNovum corporate culture

SOFTWARE THAT IS SWISS TO THE CORE.

The diverse project and customer portfolio at AdNovum offers technical experts a fascinating and challenging working environment. The AdNovum culture is based on highly skilled teams combining their initiative and technological knowledge to create innovative winning solutions.

Strong company culture

A defining part of AdNovum is the solution-oriented engineering culture, characterized by the commitment and loyalty of its employees.

AdNovum offers its employees

- modern and well-appointed workplaces
- attractive working conditions
- creative and inspiring atmosphere
- open communication channels and platforms for knowledge exchange
- variety of ongoing continuing education opportunities: on the job, internal, and company-sponsored courses and diplomas

Key data

Foundation: 1988

Executive management

- Ruedi Wipf, CEO

Staff: 175

- 70% engineers (ETH/University)

Locations

- Zurich (HQ)
- Bern
- Singapore
- Budapest

Strategic partners

AXSionics, the i-engineers, Oracle, SAP, SafeNet, wikima4

Headquarters

AdNovum Informatik AG
Ruedi Wipf, CEO
Röntgenstrasse 22, 8005 Zurich
Tel. +41 44 272 61 11, fax +41 44 272 63 12
E-mail: ruedi.wipf@adnovum.ch

Bern Office

AdNovum Informatik AG
Adrian Schmid, Branch Manager Office Bern
Erlachstrasse 16b, 3012 Bern
Tel. +41 31 952 58 58, fax +41 31 952 58 60
E-mail: info@adnovum.ch

AdNovum Singapore

AdNovum Singapore Pte. Ltd.
Martin Nokes, Managing Director
72 Anson Road, #07-01 Anson House
SG-079911 Singapore
Tel. +65 6536 0668, Fax +65 6536 2812
E-Mail info@adnovum.sg

AdNovum Hungary

AdNovum Hungary Kft.
Chris Tanner, Managing Director
Kapás utca 11-15
H-1027 Budapest
Tel. +36 1 487 5000, fax +36 1 487 5005
E-mail: info@adnovum.hu

Associated companies

AdNovum Operations AG
AdNovum Engineering AG
Röntgenstrasse 22, 8005 Zurich
Tel. +41 44 272 61 11, fax +41 44 272 63 12
E-mail: info@adnovum.ch

Media contact

AdNovum Informatik AG
Manuel Ott, Corporate Communication
Roentgenstrasse 22, 8005 Zurich
Tel. +41 44 272 61 11, fax +41 44 272 63 12
E-mail: info@adnovum.ch