UNInet:
The Indonesian Inter-University Computer Network

1. Aims of the Network

UNInet is intended to help increase the productivity of Indonesian educators and researchers in the computer field by providing them with a means to share resources and to communicate with each other. Moreover, administrators will benefit from the remote data access feature which supports integrated information processing activities among various organizations.

The original proposal for the network was published in 1983 [LuBu83], although funding and real activities did not start in earnest until late 1985. A prototype connecting 3 universities was finished in early 1986, and a demonstration was conducted in front of the annual National Meeting of Rectors on July 29, 1986 [TeSL86]. Attended by the Rectors of 45 public tertiary-institutions, the demonstration was meant to exemplify the aims of *UNInet*, namely:

a. *UNInet* is primarily aimed at linking state-owned institutions of higher-learning under the auspices of the Ministry of Education & Culture to promote the cooperation in computer-oriented education and research, and administrative data processing. It is also to be available to other interested post-secondary educational institution active in the computer field, and to any industrial and Government organization in Indonesia which is engaged in computer-related education and research, and special-purpose databases.

b. It should be capable of utilizing the various existing (and planned) telecommunications facilities in order to attain the best (i.e. the most economical) network configuration linking heterogeneous computer systems.

The Network Laboratory at the University of Indonesia (NETLAB) acts as *UNInet*'s development center. It operates the Indonesian UUCPnet country gateway: *indogtw* (previously known as *indovax*), which is accessible through international public switched data-networks (PSDN's). Currently all other nodes operate through the domestic public switched telephone network (PSTN). When a domestic PSDN becomes available, a number of *UNInet*'s nodes may conceivably opt to use the X.25 protocol. At the time of writing, work is continuing to finish connection of the first 13 sites by the first quarter of 1987.

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2. Network Architecture

The protocol currently used in *UNInet* is *uucp*, mainly because of the popularity of Unix and its availability on a wide range of hardware. Moreover, its layered architecture supports systems modularity and improve compatibility. Since in Indonesia Unix has not achieved its traditional popularity among academia, protocols other than UUCP are contemplated for future use. A high priority will be given to a protocol capable of supporting international standards (such as the CCITT X.400).

Because of the (still) high cost of communications, *UNInet* only takes institutional members as its nodes. Participating institutions interface into the network by means of a network interface, which is basically a computer running Unix, or one of its derivatives. This gateway has functions quite similar to the BITNET's IMPLET: its subnet has its own protocol (*uucp* and ACSNET's SUN-III), and each gateway connects to its host(s) using Columbia University's versatile *Kermit* software. Again, the need to utilize widely accepted standards is highly prefered, and the use of TCP/IP being contemplated for use in connecting the gateways to their respective hosts.

Four types of nodes exist, categorized by the level of services rendered. The first is the common user (CU) node, which pertains to nodes whose participation in the network mainly consists of the exchange of mail messages and the submittal of computing jobs to other (remote) nodes. The second is the regional service center (RSC) node, which is capable of performing network services for CU's in its region in addition to being a user itself. An RSC is planned to have more computing power than the CU's in its (geographic) region. At the national level, UNInet have four national service center (NSC), each with ample computing power to support requests originating from any RSC or CU. These four NSC are located in Bandung, Jakarta, Jogjakarta and Surabaya. The fourth type of node is the special service centers (SSC). These nodes render support to the network in the form of access to specialized databases, bibliographic services, cartographic data accesses, etc. It is also conceivable to have a powerful number-cruncher site as an SSC.

The gateway subnet runs at 1200 bps and is connected through dial-up PSTN. International connections currently use X.28 dial-up PSDN. Gateway-to-host links use whatever services are available locally on-campus: local-area networks, 9.6kbps direct lines, or modem lines through campus PABX.

3. Accessible Sites

International access to *UNInet* hosts is done through the country gateway: *indogtw*. This gateway is currently accessible through *seismo*, *kaist*, and *munnari*. Hosts connected over PSTN dialup lines in the first stage of *UNInet* are as follow:

Site #1:   University of Indonesia, Jakarta

```
Name           : indogtw
Organization: Network Laboratory
Contact        : Dr. Joseph F.P. Luhukay & Benny Somali
Phone          : (+62 21) 330303/335766
Host           : MV/2000 (DG/UX) as gateway to a campus-LAN
                 (Ethernet)
P-mail addr : PO Box 3442, Jakarta 10002, Indonesia
E-mail addr : indogtw!luhukay & indogtw!somali
News           : kaist seismo
Mail           : seismo kaist munnari mimos phinist nusee
                 kmithai itbcs ugmdp len lin lipi


Name           : uics
Organization: Computer Science Center
Contact        : Dr. Joseph F.P. Luhukay
Phone          : (+62 21) 330303/335766
Host           : VAX 11/750 (4.2bsd)
P-mail addr : PO Box 3442, Jakarta 10002, Indonesia
E-mail addr : indogtw!uics!luhukay
News           : indogtw
Mail           : indogtw seismo kaist munnari itbcs ugmdp ut
                 unhasdp ipbdp itsdp ikipjkt len lin lipi bppt


Name           : uieng
Organization: Faculty of Engineering
Contact        : Dr Djamhari Sirat
Phone          : +62 21 330256
Host           : VAX 11/750 (VMS) running SUN-III
P-mail addr : Jln Salemba 4, Jakarta Pusat, Indonesia
E-mail addr : indogtw!uics!uieng!djamhari
News           : uics
Mail           : uics
```

Site #2: Bandung Institute of Technology, Bandung

```
Name           : itbcs
Organization: Department of Informatics
Contact        : Dr Farid Wazdi
Phone          : +62 22 87746
Host           : Micro-PDP/11 (Unix) and MV/2000 (AOS/VS)
                 with AOS/UX
P-mail addr : Jln Ganesha 10, Bandung, Indonesia
E-mail addr : indogtw!uics!itbcs!farid
News           : uics
Mail           : uics itbic itbdp
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Name          : itbic
Organization: Microelectronics Center
Contact       : Prof Samaun Samadikun
Phone         : +62 22 84252 Ext 405
Host          : PC-AT (Xenix) as gateway to a PC-network
P-mail addr : Jln Ganesha 10, Bandung, Indonesia
E-mail addr. : indogtw!uics!itbcs!itbic!samaun ...
News          : itbcs
Mail          : itbcs len


Name          : itbdp
Organization: Data Processing Center
Contact       : Dr Naya
Phone         : +62 22 84252 Ext 490
Host          : PC-AT (Xenix) as gateway to an IBM 3031
P-mail addr : Jln Ganesha 10, Bandung, Indonesia
E-mail addr : indogtw!uics!itbcs!itbdp!naya
News          : itbcs
Mail          : itbcs
```

Site #3: Gajahmada University, Yogyakarta

```
Name          : ugmdp
Organization: University of Gajah Mada, Yogyakarta
Contact       : Drs. Widodo Priyodiprojo
Phone         : +62 274 88688
Host          : MV/2000  (AOS/VS) with AOS/UX as gateway to  a
                VAX 11/730 (VMS)
P-mail addr : Jln Bulaksumur, Yogyakarta
E-mail addr : indogtw!uics!ugmdp!widodo
News          : uics
Mail          : uics itbcs
```

Site #4: Surabaya Institute of Technology, Surabaya

```
Name          : itsdp
Organization: Data Processing Center
Contact       : Dr. Soepeno Djanali
Phone         : +62 31 60652/60653/60654 Ext 222
Host          : MV/2000  (AOS/VS) with AOS/UX as gateway to  a
                Honeywell-Bull DP6 and a number of PC's
P-mail addr : Jl. Keputih Sukolilo, Surabaya
E-mail addr : indogtw!uics!itsdp!soepeno
News          : uics
Mail          : uics
```

Site #5: Indonesian Open University, Pondok Cabe

```
Name          : ut
Organization: Data Processing Center
Contact       : Prof Setiadi
Phone         : +62 21 741023/741375/741548
Host          : PC-AT (Xenix) as gateway to an MV/4000
P-mail addr :
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        E-mail addr : indogtw!uics!ut!setiadi
        News        : uics
        Mail        : uics

Site #6: IKIP, Jakarta

        Name        : ikipjkt
        Organization: Data Processing Center
        Contact     : Dr Dali S Naga
        Phone       : +62 21 4890108/4891710
        Host        : PC-AT (Xenix) as gateway to an IBM S/34
        P-mail addr : Jln Daksinapati, Rawamangun, Jakarta
        E-mail addr : indogtw!uics!ikipjkt!dali
        News        : uics
        Mail        : uics

Site #7: Hasanuddin University, Ujungpandang (Sulawesi)

        Name        : unhasdp
        Organization: Data Processing Ctr, Hasanuddin University
        Contact     : Drs. Suarga M.Sc.
        Phone       : +62 411 3676
        Host        : MV/2000  (AOS/VS) with AOS/UX as gateway to  a
                      Honeywell-Bull DP6
        P-mail addr : Jl. Mesjid Raya 55, Ujung Pandang
        E-mail addr : indogtw!uics!unhasdp!suarga
        News        : uics
        Mail        : uics

Site #8: Bogor Institute of Agriculture, Bogor

        Name        : ipbdp
        Organization: Data Processing Ctr, Bogor Inst of Agriculture
        Contact     : Ir. M. Syamsun M.Sc.
        Phone       : +62 251 23081 Ext 272
        Host        : MV/2000 (AOS/VS) with AOS/UX
        P-mail addr : Jl. Raya Pajajaran, Bogor
        E-mail addr : indogtw!uics!ipbdp!syamsun
        News        : uics
        Mail        : uics

Site #9:   Directorate  General of Higher Education,  Ministry  of
           Education and Culture, Jakarta

        Name        : dikti
        Organization: Data Processing Center
        Contact     : Dr. Purwadi
        Phone       : +62 21 581251/581252
        Host        : MV/2000  (AOS/VS) with AOS/UX as gateway to  a
                      Honeywell-Bull DP6 and a PC-network
        P-mail addr : Pintu I Senayan, Jakarta
        E-mail addr : indogtw!uics!dikti!purwadi
        News        : uics
        Mail        : uics
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Site #10: Indonesian Institute of Sciences, Jakarta

```
     Name         : lipi
     Organization: Executive Adviser's Office
     Contact      : Prof Muhamadi
     Phone        : +62 21 512362
     Host         : PC-AT (Xenix)
     P-mail addr  : Jln Gatot Subroto, Jakarta
     E-mail addr  : indogtw!uics!lipi!muhamadi
     News         : uics
     Mail         : uics
```

Site #11: National Engineering Laboratory, Bandung

```
     Name         : len
     Organization: Computer Center
     Contact      : Suryadi
     Phone        : +62 22 51515/51952/50677
     Host         : VAX 11/750 (VMS) with SUN-III
     P-mail addr  : Jln Sukarno-Hatta, Bandung
     E-mail addr  : indogtw!uics!len!suryadi
     News         : uics
     Mail         : uics itbic
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Site #12: National Instrumentation Laboratory, Serpong

```
     Name         : lin
     Organization: Computer Center
     Contact      : Riginoto Wijaya
     Phone        : +62 21 516165/515248
     Host         : Motorola (Unix System V) as gateway to a LAN
                    (which includes a VAX 11/750 (VMS))
     P-mail addr  : Puspiptek, Serpong, Tangerang
     E-mail addr  : indogtw!uics!lin!riginoto
     News         : uics
     Mail         : uics
```

Site #13: National Technology Assessment & Development Board,
          Jakarta

```
     Name         : bppt
     Organization: Computer Center
     Contact      : Iman Sudarwo
     Phone        : +62 21 321874
     Host         : PC-RT (Unix) as gateway to a LAN (which
                    includes an HP/3000)
     P-mail addr  : Jln Thamrin, Jakarta
     E-mail addr  : indogtw!uics!bppt!iman
     News         : uics
     Mail         : uics
```

4. Gateways to other networks

There are 3 UUCP gateways to other networks over X.28 dialup PSDN, i.e. :

```
USRNET & most of other networks : seismo
SDN (South Korea)               : kaist
ACSNET & CSIRONET (Australia)   : munnari
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Currently under development is *AUSEAnet*, a metanetwork linking Southeast Asian countries (Indonesia, Singapore, Malaysia, Thailand, Philippines and Brunei Darussalam) and Australia. *AUSEAnet* aims to support an international joint project in microelectronics among these countries. Indonesia is selected as the regional center for *AUSEAnet* and *indogtw*, operated as a host on the international PSDN, is polled regularly by participating national gateways. Polling may also use IDD services available at the country-gateway sites. *AUSEAnet*'s regional node and country-gateways are as follow:

Regional Center:

```
Name         : indogtw
Organization: Network Laboratory, University of Indonesia
Contact      : Dr Joseph Luhukay & Benny Somali
X.121 addr   : 051011085
IDD modem    : +62 21 330308   (1200 bps)
Phone        : (+62 21) 330303 & 335766
Host         : MV/2000 (DG/UX)
P-mail addr  : PO Box 3442, Jakarta 10002, Indonesia
E-mail addr  : indogtw!luhukay & indogtw!somali
```

Country Gateways:

```
Name         : munnari
Organization: Melbourne University, Australia
Contact      : Robert Elz
X.121 addr   : 050523342200085
IDD modem    :
Phone        :
Host         :
P-mail addr  :
E-mail addr  : munnari!elz

Name         : nusee
Organization: Elect Eng Dept, National Univ of Singapore
Contact      : Dr Kwok Chee Yee
X.121 addr   :
IDD modem    :
Phone        : 7722128
Host         :
P-mail addr  : Kent Ridge, Singapore 0511
E-mail addr  : nusee!cykwok
```

```
Name         : mimos
Organization:
Contact      : Dr Moh bin Awang-Lah
X.121 addr   :
IDD modem    :
Phone        : 03-2987200
Host         : VAX 11/750 (VMS)
P-mail addr  : Jl. Kerja Air, Kuala Lumpur 50480.
E-mail addr  : mimos!awang

Name         : phinist
Organization: Philippine National Institute of Science & Tech
Contact      : Edgardo Juan
X.121 addr   :
IDD modem    :
Phone        : 503041
Host         :
P-mail addr  : PO BOX 744, Manila
E-mail addr  : phinist!juan

Name         : kmithai
Organization: King Mongkut Inst of Technology, Thailand
Contact      : Dr Phairash Thajajapong
X.121 addr   :
IDD modem    :
Phone        : 3269985-6
Host         :
P-mail addr  : Ladkrabang, Bangkok
E-mail addr  : kmithai!phairash
```

5. Available Facilities for End-Users

A user interfacing with *UNInet* can perform any combination
of the usual network functions, namely:
   - send/receive electronic mail
   - transfer files
   - submit a batch-job to a remote computer
   - interactively logon a remote system

6. Addressing Structures

uucp-like host!user addressing is implemented, and routing
is specified at the sender's machine. The format is as follows;

   host1!host2!...!hostn!user

where *hostn* is the destination computer, and *host1!host2!...hostn*
specifies the path the message is to take from the sender's
machine to *hostn*.

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For international traffic, the single gateway *indogtw* is used. This routing restriction is imposed basically due to administrative reasons.

7. Administration

UNInet is sponsored by and conducted under the auspices of the Directorate General of Higher Education (DGHE), Department of Education and Culture. DGHE is also the main source of funding for the development and operations of *UNInet*. Technical and administrative support is performed by the NRTLAB at University of Indonesia.

8. Current Status

UNInet started with 3 sites, namely University of Indonesia (Jakarta), Bandung Institute of Technology (Bandung) and Gajahmada University (Yogjakarta). The first major development issue at this stage is to set up the proper environment for computer communications to find the best configuration. This often includes "mundane" tasks such as acquiring basic telecommunication services. Interest to join the network is high, although budgetary limitations often dampen the enthusiasm. The list of sites/hosts given above reflects those most ready to join. It is hoped that at the end of the first quarter of 1987, all 13 sites will be connected.

As of August 1986, 5 sites with 7 hosts are linked through *UNInet*. All links use dial-up telephone lines with 1200 bps modems. Cooperation with the Indonesian Satellite Corp resulted in free packet-switching on the international lines.

9. Future plans

Plans for the future include service expansions and improvements, namely:

a. The use of domestic PSDN as it becomes available. This will be used for a high-speed back-bone service.
b. Protocol improvements by adopting an international standard, in this case the CCITT X.400. Negotiations with the University of British-Columbia (Canada) will be resumed to used the EAN software for *UNInet*.
c. Merging the "informal" services of this type of network with those which are more "formal" in nature. This includes batch-

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mode library or database accesses, requirements which are high on the priority list of the Indonesian science & technology community.

10. Administrative and Technical Contacts

Liaison   : Dr. Joseph F.P. Luhukay
Technical contact : Andreas Tedja
                    Benny Somali

Address   : NETLAB, University of Indonesia
                    PO BOX 3442
                    Jakarta 10002, Indonesia
                    Telex: 45680 UI JKT

References

[LuBu83] J.   Luhukay and B. Budiardjo: *An Inter-University Network*, Asia Electronic Symposium, Jakarta, October 19-20, 1983.

[TeSL86] A. Tedja, B. Somali and J. Luhukay: *Development of an Inter-Campus Network: The Indonesian Case*, International Information Management Conference '86, Singapore, August 27-29, 1986.